FINAL

ENVIRONMENTAL ASSESSMENT
2-MW WIND TURBINE GENERATORS

UNITED STATES COAST GUARD
TRAINING CENTER
(TRACEN)
CAPE MAY, NEW JERSEY

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EXECUTIVE SUMMARY

The United States Coast Guard (USCG) proposes to construct and operate a wind power project at the USCG Training Center (TRACEN) in Cape May, New Jersey. The purpose of the proposed action is to create a cost efficient and technically feasible renewable energy project at TRACEN that would maximize the USCG's ability to meet the renewable power supply goals set forth in the Energy Policy Act of 2005 (EPAct 2005) and Executive Order (EO) 13423 without incurring significant environmental impacts. The preferred alternative consists of construction of two wind turbines with a total installed capacity of approximately 4 Megawatts (MW). The wind turbines would be located at sites designed to minimize environmental impacts; their impacts on TRACEN operations would be minimal.

In this Environmental Assessment (EA), USCG screened renewable energy alternatives (purchasing renewable energy, solar, wind, and 50/50 wind/solar) and concluded that wind energy provided the greatest potential for achieving USCG objectives. The "No Action" Alternative would not fully achieve the project purpose, since while renewable energy would be purchased from off-site sources to meet the requirements of the EO, TRACEN would not be meeting USCG's need for developing secure self-sustaining renewable energy sources. Alternatives such as purchasing energy generated from landfill gas production would require development of such facilities off-site by others, and USCG would be dependent upon those suppliers during critical periods. This would not meet the objectives of self-sufficiency of energy production and security concerns at TRACEN.

Of the wind energy alternatives screened, USCG also determined that two 2-MW turbines provided optimal energy efficiency while minimizing environmental impacts. USCG screened and then further evaluated different on-site alternative locations for siting of the two turbines, initially concluding that the two preferred locations were Locations D and E-Alt (Figure 2-1). However, after further consultation with NORESCO it was determined that two other locations were more feasible alternatives. These are identified on Figure 2-2 as Perchard Avenue Location 1 and Buoy Yard Location 1. The environmental impacts from these two locations are not considered to be significantly different than the two locations previously proposed, and the turbines would be less noticeable from prominent Cape May locations.

Analysis of impacts based on currently available data suggests no significant impacts would occur from the project. This includes an additional avian survey conducted in 2009 to address agency concerns and issues that arose during the Phase I avian risk assessment regarding potential avian impacts from the project. The greatest *potential* for environmental impacts from the proposed project is direct mortality to birds and bats, including federally threatened and New Jersey endangered piping plover, New Jersey endangered Least Tern and Peregrine Falcon, and New Jersey threatened Ospreys. Scientific data indicates that this mortality would not be biologically significant, and may be mitigated through various measures, such as reduced turbine operation during key migratory or life history periods for the species indicated. As a result of this EA, USCG has not identified any significant impacts from the project. USCG will again solicit public comment prior to finalizing this EA.

CHAPTER 1
PURPOSE OF AND NEED FOR THE PROPOSED ACTION

1.1 DESCRIPTION OF THE PROPOSED ACTION

The United States Coast Guard (USCG) proposes to construct and operate a wind power project at the USCG Training Center (TRACEN) in Cape May, New Jersey (Figure 1-1). The purpose of the proposed action is to create a cost efficient and technically feasible renewable energy project at TRACEN that would maximize the USCG's ability to meet the renewable power supply goals set forth in the Energy Policy Act of 2005 (EPAct 2005) and Executive Order (EO) 13423 without incurring significant environmental impacts. The preferred alternative consists of construction of two wind turbines with a total installed capacity of approximately 4 Megawatts (MW). The wind turbines would be located at sites designed to minimize environmental impacts; their impacts on TRACEN operations would be minimal.

The proposed wind turbine generator system would produce approximately 75 percent of TRACEN's electricity, utilizing the renewable wind power readily available at Cape May. Power generated would be integrated into the existing electricity distribution loop serving TRACEN and would partially replace electricity provided by the utility company. During periods when the wind turbine generators produce more electricity than is needed at TRACEN, power would be supplied to the electric utility and the USCG would be reimbursed.

1.2 PURPOSE OF THE ENVIRONMENTAL ASSESSMENT

The National Environmental Policy Act, commonly known as NEPA, is a Federal statute requiring the identification and analysis of potential environmental impacts of proposed Federal actions before those actions are taken. NEPA established the Council on Environmental Quality (CEQ), which is charged with the development of implementing regulations and ensuring Federal agency compliance with NEPA. CEQ regulations mandate that all Federal agencies, including the USCG, use a systematic interdisciplinary approach to environmental planning and the evaluation of actions that may affect the environment. This process evaluates potential environmental consequences associated with a proposed action and considers alternative courses of action. The intent of NEPA is to protect, restore, or enhance the environment through well-informed Federal decisions.

For the purposes of implementing the TRACEN Wind Power Project, an Environmental Assessment (EA) has been chosen as the appropriate level of NEPA analysis. The EA is a document used to determine whether there is a potential for significant environmental impacts, or whether significant environmental impacts are unlikely. Based on the outcome of the EA, the USCG would then prepare either an Environmental Impact Statement (EIS) that further analyzes environmental issues, or a Finding of No Significant Impact (FONSI) (40 CFR 1508.9).

As required under NEPA, this EA has been conducted to study the potential impact of the proposed project. This EA for the proposed wind turbine generator installation focuses on the following primary resource areas:

- Hazardous materials;
- Biological resources;
- Utility services;
- Noise;
- Aesthetics; and
- Cultural resources (Archaeological and Historical).

Other resources/potential impacts that are discussed, but are less likely to be affected by the project, include:

- Geology;
- Hydrology;
- Air quality;
- Housing;
- Transportation;
- Community services; and
- Population/Economics.

To comply with NEPA, the planning and decision-making process for actions proposed by Federal agencies involves a study of other relevant environmental statutes and regulations. The NEPA process, however, does not replace procedural or substantive requirements of other environmental statutes and regulations. It addresses them collectively in the form of an EA or EIS, which enables the decision-maker to have a comprehensive view of major environmental issues and requirements associated with the proposed action. According to CEQ regulations, the requirements of NEPA must be integrated "with other planning and environmental review procedures required by law or by agency so that all such procedures run concurrently rather than consecutively." As such, implementation of projects identified in the Plan may require consideration of potential environmental effects.

1.3 COMPLIANCE WITH THE NATIONAL ENVIRONMENTAL POLICY ACT

The process for implementing NEPA is codified in 40 Code of Federal Regulations (CFR) 1500-1508, *Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act*. The CEQ was established under NEPA to implement and oversee Federal policy in this process. To this end, the CEQ regulations specify that an EA be prepared to:

- Briefly provide evidence and analysis for determining whether to prepare an EIS or a FONSI;
- Aid in an agency's compliance with NEPA when an EIS is unnecessary; and
- Facilitate preparation of an EIS when one is necessary.

Table 1-1 presents a summary of the NEPA analysis incorporated in this EA, indicating the NEPA requirement and corresponding section of this EA.

Table 1-1. Roadmap Indicating NEPA Analysis and Corresponding EA Sections

Required NEPA Analysis	Corresponding EA Section
Executive Summary – briefly describes the proposed action, environmental consequences, and mitigation measures.	ES
Purpose and Need for the Proposed Action – summarizes the proposed action's purpose and need and describes the scope of the environmental impact analysis process.	1.4
Scope of Analysis – describes the scope of the environmental impact analysis process.	1.5
Description of the Proposed Action and Alternatives – describes the proposed action of constructing the proposed wind power project and alternatives to the implementation of the Proposed Action.	1.1, 2
Affected Environment – describes the biotic environment and the general physical environment potentially affected by the proposed or alternative actions	3
Environmental Consequences – identifies the potential environmental impacts of implementing the proposed wind power project or alternative actions.	4
Cumulative Effects – identifies potential cumulative impacts of the proposed action along with the impacts of other past, present and reasonable foreseeable actions.	5
Relationship Between Short-term Use of the Environment and the Maintenance and Enhancement of Long-Term Productivity	6
Irreversible and Irretrievable Commitments of Resources	7
Consideration of Secondary and Cumulative Impacts	8
References – provides a list of sources utilized in the preparation of the EA.	9
List of Preparers – identifies persons who prepared the document and their areas of expertise and training.	Appendix E
Persons Consulted – provides a list of persons and agencies consulted during the preparation and approval of the EA.	Appendix F
Distribution List – indicates recipients of the EA.	Appendix H
Agency Consultation Letters – copies of these letters and supplemental information used in the preparation of the EA.	Appendix G

1.4 PURPOSE AND NEED FOR THE PROPOSED ACTION

The purpose of the proposed action is to create a cost efficient and technically feasible renewable energy project at TRACEN in order to maximize the USCG's ability as a federal agency to meet the renewable power supply goals set forth in the EPAct 2005 and EO 13423 without incurring significant environmental impacts.

EPAct (2005) specified that of the total amount of electric energy the Federal Government consumes during any fiscal year, the following amounts shall be renewable energy:

- Not less than 3 percent in fiscal years 2007 through 2009;
- Not less than 5 percent in fiscal years 2010 through 2012; and
- Not less than 7.5 percent in fiscal year 2013 and each fiscal year thereafter.

EPAct 2005 further specified that for purposes of determining compliance, the amount of renewable energy shall be doubled if the renewable energy is produced and used on-site at a federal installation.

EO 13423 included the following additional goals for Federal agencies:

(a) Improve energy efficiency and reduce greenhouse gas emissions of the agency, through reduction of energy intensity by (i) 3 percent annually through the end of fiscal year 2015, or (ii) 30 percent by the end of fiscal year 2015, relative to the baseline of the agency's energy use in fiscal year 2003; and
(b) Ensure that (i) at least half of the statutorily required renewable energy consumed by the agency in a fiscal year comes from new renewable sources, and (ii) to the extent feasible, the agency implements renewable energy generation projects on agency property for agency use.

A preliminary feasibility study conducted by Noresco, L.L.C. (Noresco) concluded that at TRACEN, there is a strong opportunity to utilize the wind resource as the principal renewable power readily available there. Motivated by USCG personnel, the National Renewable Energy Laboratory (NREL) supplied wind metering equipment which was installed on the Rescue 21 tower. (The Rescue 21 tower is located on TRACEN and hosts a passive receiver used to monitor marine and aircraft distress signals so that USCG can respond. It was designed "unguyed" to lessen the chance of bird strikes and three years of study have shown only one Falcon killed recently.

USCG and NREL have been collecting wind and other meteorological data since August 2007. The preliminary results show a vigorous and consistent wind resource, with average annual wind speeds of over 15.7 miles per hour (mph) at a height 250 ft above the ground.

The State of New Jersey has been proactive regarding their support of renewable power and has set up financial incentives and standardized net metering regulations for systems up to 2-MW per meter connection. Net metering allows small power producers to interconnect with the utility, and in essence use the electrical grid as a battery. This is advantageous because of the intermittent nature of the wind resource, and the fact that during periods when the wind turbine generators produce more electricity than is needed, power would be supplied to the electric utility for other users to purchase.

As a result of these preliminary studies, and a review of other renewable energy alternatives available, USCG determined that a wind power project was viable at TRACEN and was the preferred means of achieving the project purpose. USCG contracted Noresco to develop a conceptual design, and Noresco contracted with Weston Solutions, Inc (Weston®), Curry and Kerlinger, LLC (avian ecologists), and Northeast Ecological Services (NEES) to prepare this EA.

1.5 SCOPE OF THE ANALYSIS

The scope of the analysis for this EA consists of assessment of potential environmental impacts from proposed construction of two 2-MW wind turbines at TRACEN. Because it is a Federal installation and the proposed project has a limited building footprint that would occur entirely on

site, the scope of the assessment focuses on TRACEN itself. However, in cases where potential off-site impacts are possible (e.g., views of the wind turbines from off-site locations) those impacts have been assessed.

CHAPTER 2
THE PROPOSED ACTION AND ALTERNATIVES

2.1 "NO ACTION" ALTERNATIVE

Under the "No Action" Alternative the USCG would not construct wind turbines to meet the requirements of EPAct 2005 and EO 13423. As a result, USCG would be forced to purchase renewable energy from off-site to meet the requirements of EO, but would not be able to meet its own renewable energy goals.

These goals include:

- Ensuring that *to the extent feasible,* USCG implements renewable energy projects on agency property for agency use; (EO 13423)
- Achieving compliance goals through doubling the amount of credit for renewable energy by producing and using it on site at a federal installation; (EPAct 2005)
- Increasing energy security and reducing vulnerability to price spikes and reduce overall agency emissions. (NREL 2005).

Under the "No Action" Alternative, TRACEN would continue to explore energy conservation measures to the extent practical within existing budgets, as part of an overall sustainability program. For example, the USCG has entered into a Utility Energy Savings Contract (UESC) with the South Jersey Gas Company to supply energy conservation services to TRACEN in Cape May, NJ. The scope of the conservation services were focused on 168 USCG residential housing units located outside the main gate to TRACEN. Presently the units have either electric baseboard resistance heat or warm air gas furnaces that were installed in the early 1970's. Also being replaced are the existing window box air conditioning (A/C) units that have Seasonal Energy Efficient Ratings (SEER) of below 7.

New high efficiency warm air furnaces with matching A/C systems are presently being installed. The furnaces have an efficiency rating of 93 to 95 percent. The new central A/C systems have a SEER rating of 14 to 15. Along with this huge undertaking the USCG is installing new low flush toilets, and changing out all incandescent bulbs of 75 to 100 watts (approximately 33 to 35 in each of the 168 units) to new compact florescent that are 11 to 14 watts each. The USCG has tasked the gas company with adding attic insulation and air sealing of the units. Because of the conservation measures the USCG would realize annual savings of $200,000 on fuel and electricity for the foreseeable future. This work is an important part of the process to reach USCG's energy reduction goals for EPAct 2005.

However, if the "No Action" Alternative were adopted, the proposed wind project would not be constructed, nor would any of the other renewable energy alternatives described in section 2.2 below. To meet the mandate of the Executive Order, USCG would be forced to purchase renewable energy from off-site sources. Thus USCG would continue to be subject to expensive energy costs and market price fluctuations. Because of the higher price associated with purchasing renewable energy produced off-site by others, the amount of renewable energy used by TRACEN would be an order of magnitude less than if it were produced at TRACEN. While the proportion of renewable energy used by TRACEN would still increase relative to current

conditions, the "No Action" Alternative would not achieve the project purpose, since no additional renewable energy would be produced at TRACEN.

2.2 RENEWABLE ENERGY ALTERNATIVES

Prior to preparation of this EA, several renewable energy alternatives were initially screened and evaluated by the USCG for TRACEN. Programmatically, the USCG evaluated potential renewable energy sources nationwide, through a study prepared by NREL in 2005 (NREL 2005). The evaluation included solar energy, wind energy, geothermal resources and biomass resources as potential renewable energy sources at USCG facilities. In addition to meeting renewable energy goals, the program would increase agency energy security, reduce vulnerability to price spikes and supply shortages and reduce overall emissions associated with the agency.

Of the 850 active USCG sites evaluated, NREL ranked TRACEN amongst the highest for potential wind energy development; TRACEN was one of 69 sites that were considered as having a Class 4 wind resource. Class 4 wind sites have sufficient wind energy development potential to be cost competitive with electric utility rates in many parts of the country. In contrast, TRACEN did not rank highly with respect to solar energy development, geothermal energy development, or biomass development, with the exception of potential landfill gas energy use from off-site sources. Landfill gas potential was measured County-wide based on landfills present in the County, and would require TRACEN to either purchase landfill gas or construct a landfill gas facility outside of the Installation, which would not meet USCG's security goals. As a result, landfill gas generation was rejected as an alternative requiring further consideration.

The USCG conducted a preliminary evaluation based upon NREL modeling of potential renewable energy options that might meet renewable energy goals at TRACEN. USCG conducted initial screening of four major renewable energy sources.

- Purchasing renewable energy from an off-site supplier;
- Developing a 10-MW solar energy project on TRACEN to meet the equivalent annual electrical output of providing 4-MW of wind generation capacity;
- Constructing two wind turbines capable of producing 4-MW of renewable energy capacity; and,
- Providing an approach where 50 percent of the renewable energy is produced by solar and 50 percent is produced by wind.

The anticipated energy production from implementation of each of these alternatives is summarized in Table 2-1 below.

Table 2-1 Comparison of Renewable Energy Alternatives

Alternative	Wind Energy (kWh/yr)	Solar Energy (kWh/yr)	Total
"No Action"	-	-	1,076,700*
Solar Only		11,037,600	11,037,600
Solar and Wind (50/50)	5,708,892	5,518,800	11,227,692
Wind	11,417,784		11,417,784

*Purchased from off-site sources.

The annual electricity consumption of TRACEN is approximately 14,356,000 kilowatt hours (kWh) and the peak demand is approximately 2.7 MW. Per EPAct 2005, by the year 2013 at least 7.5 percent or 1,076,700 kWh/yr should be from renewable sources. Per EO 13423, at least 538,350 kWh/yr should be from new renewable sources, and where feasible those sources should be located on USCG property. EO 13423 also includes guidance on increasing renewable energy in Energy Savings Performance Contracts (ESPCs).

The "Solar Only" Alternative would not be viable since it would require that many acres of the installation be covered with solar panels to achieve the project purpose; with corresponding impacts to operations as well as environmental impacts from covering remaining habitat. The "Solar Only" Alternative is based on installing 10-MW of PV capacity. This matches the annual electricity production of two 2-MW wind turbines but requires a much higher installed capacity because of the lower capacity factor of PV at TRACEN. The PV modules selected for analysis were Evergreen Solar ES-A-210, which have an energy density of 12.4 W/sq.ft or 216 kW/acre. The installation of solar panels sufficient to generate 10-MW of power would require 47,600 panels covering 46 acres, and, as a result, would not be a viable alternative at TRACEN due to lack of space. In addition, the solar energy potential of TRACEN was not rated nearly as high as that for wind energy (NREL 2005).

The "Solar and Wind" Alternative assumes that half of the electrical energy capable of being generated by two 2-MW wind turbines is generated by solar. This alternative would require that 23,800 solar modules be installed, which would cover 23 acres and hence more area than is available on TRACEN. In addition, the "Solar and Wind" Alternative would not be economically viable since the economic return from operating 2-MW of wind capacity plus 5-MW of PV capacity would not offset the cost of construction within a reasonable time frame to justify the investment.

Wind energy was thus selected as the most desirable renewable energy production alternative. Specific wind energy alternatives are discussed below.

2.3 WIND ENERGY ALTERNATIVES

2.3.1 Summary Comparison of Wind Energy Alternatives

Four different wind energy alternatives were initially screened for implementation at TRACEN:

- Construction of three 2-MW wind turbines and associated towers;
- Construction of two 2-MW wind turbines and associated towers;
- Construction of three 1-MW wind turbines and associated towers; and
- Construction of a single 2-MW wind turbine and associated tower.

The anticipated energy production from implementation each of the different wind energy alternatives is summarized in Table 2-2 below.

Table 2-2 Comparison of Screening Wind Energy Options

Alternative	Wind Energy (kWh/yr)	Construction Cost	Impact Area (SF)	Advantages	Disadvantages
(3) 2-MW Turbines	17,126,676	$22,172,700	130,680	Higher output would advance USCG closer to goals	Third location would be difficult to site without potential for Installation or environmental impacts
(2) 2-MW Turbines	11,417,784	$14,781,800	87,120	Higher output advances USCG closer to goals	More visible, greater opportunity for impacts than a single turbine.
(3) 1-MW Turbines	7,340,004	$9,556,800	130,680	Higher output than a single 2-MW turbine.	Larger impact area not justified by energy production
(1) 2-MW Turbine	5,708,892	$7,581,800	43,560	Smaller impact area; less visible and lower potential for bird/bat impacts	Lower output would not meet USCG goals.

Based on review of production estimates and environmental factors discussed in Section 2.3.2 below, the alternative to build two 2-MW wind turbines was chosen as the preferred alternative.

2.3.2 Description of the Preferred Alternative

The preferred alternative thus calls for construction of two 2-MW wind turbines, located at two different locations at TRACEN. The preferred alternative was selected for the following reasons:

- This alternative would provide 4-MW of power, and, with the exception of the 3 turbine alternative, comes closest to meeting the USCG's renewable energy needs in an efficient manner;
- Construction of two turbines is logistically practicable in that USCG can effectively and efficiently tie in to the electric power grid making best use of existing infrastructure;
- The alternative can be constructed to minimize environmental impacts, and results in the biggest return for the capital invested by the USCG on behalf of the taxpayer.

In New Jersey, customers with renewable generation capacity can export power to their electric utility and be reimbursed at the retail rate of their electric tariff. To take advantage of net metering, the renewable generation capacity is currently limited to 2-MW per utility meter. If in a given hour, a customer's load is 1-MW but their wind turbines are generating 2-MW of electric power, they can export 1-MW to the utility and be credited for that power on their utility bill. On a monthly basis, a customer may export more than they use, but if at the end of a 12-month period they were a net exporter of electricity, they would be credited at a much lower wholesale

electric rate. The wind turbines would not have any associated storage capacity. All power that is not used to meet TRACEN's electric loads would be exported to the utility and net metered. As a result, constructing a 4-MW wind energy project using two 2-MW turbines each subject to the 2-MW metering ceiling would result in the most efficient and economical means of the USCG investing in renewable energy generation.

The wind turbine at the primary location (described below) would tie into an electrical loop whose capacity is limited by the existing distribution equipment. Thus, the wind turbine generation capacity tied into that loop can be no greater than approximately 2-MW, which is the maximum installed capacity per utility meter for net metering. However, given a wind capacity factor of approximately 35 percent and TRACEN's annual consumption of 14,356,000 kWh, the energy provided by 2-MW of wind capacity (approximately 5,700,000 kWh/yr) is well below the total annual consumption. Adding a second electric utility meter and wind turbine would allow additional loads to be served by renewable energy. The wind turbine at the secondary location (described below) would tie into the medical feeder via underground conduit.

Turbine Specifications

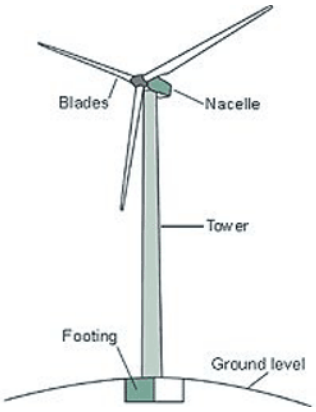
Two 2-MW turbines are proposed to be installed at the Perchard Avenue 1 and Buoy Yard 1 locations shown on Figure 2-2. When the turbines are operational the total effective height of each would be 420 feet (ft) to the tip of the extended blade from ground level. The minimum ground clearance of each turbine would be 110 ft. Specifications of the 2-MW model are summarized in Table 2-3 below. Figure 2-2 shows the basic elements of a wind turbine and key terminology used in this EA.

Table 2-3 General Specifications for 1.8-2.0-MW Wind Turbine Model

General Characteristic	1.8-2.0-MW Model
Output	1.8-2.0 MW
Rotor Diameter	295 ft
Rotor Hub Height	263 ft
Rotor Swept Area	68,484 ft^2
Operating Wind Speed	8.9 mph
Maximum Power Output Wind Speed	55.9 mph
Operating Rotor Speed	9.3-16.6 rpm
Maximum Blade Tip Speed	257 ft/s

Source: Manufacturer Data (Vestas)

Figure 2-2 Diagram of Wind Turbine



Source: Sustainable Energy Programs Australia Department of Energy, 2005.

The 2-MW wind turbines proposed for construction would be a state-of-the-art, three-bladed, upwind, horizontal-axis model similar to the Vestas V-90. On this model, the generator is located in a nacelle mounted on a tubular steel tower. The nacelle is the housing for the gear box and generator that is mounted on top of the tower (Figure 2-2). Electronic controls rotate the nacelle to face into the wind, and adjust the pitch of the blades to regulate rotor speed.

Exterior surfaces of each wind turbine would be white or grayish-white. Because of their height, aircraft warning lights would be required on at least one of the two towers. The exact number and type of lights would be determined in consultation with the Federal Aviation Administration and would incorporate U.S. Fish and Wildlife Service guidelines.

Turbine Construction

Both turbines would be located on developed portions of TRACEN. The turbine to be constructed at the Buoy Yard location would be located adjacent to an existing asphalt parking lot (Figure 2). A small access road will need to be constructed and some land will need to be cleared of vegetation. A work zone of about one-half acre would be required for assembling and installing the turbine components.

In the case of the Perchard Road location, the area is presently covered with lawn (Yard-2).

Portions of these areas would undergo minor re-grading as necessary for a crane pad and material assembly. Most of the area disturbed would be re-vegetated once construction is completed. Each wind turbine would rest on a cylindrical concrete foundation 15 - 20 ft in diameter. The depth of the foundation or pilings is dependent on existing soil and bedrock conditions, which are sandy. Additional geotechnical studies may be necessary to determine the piling depth if the project receives agency approval. Foundation excavation would be done using standard excavation equipment. Dust control measures will be implemented during construction, as will standard soil erosion and sediment control practices.

Once the foundation is completed, the surrounding area would be restored as nearly as possible to the pre-construction condition. The turbines would be erected in sections using a large crane to lift components into position and a smaller crane to move parts and assemble the rotors.

The wind turbine at the Perchard Avenue 1 location is located about 175 feet from its originally proposed location (location E-Alt) and would tie into the main switchgear via underground conduit. The wind turbine proposed at the Buoy Yard 1 location would require some additional underground conduit in order to tie into the main switchgear. Neither line would disturb any undeveloped areas. Any interconnection would comply with New Jersey's "Net Metering and Interconnection Standards for Class I Renewable Energy Systems," including anti-islanding protection.

2.3.3 On-Site Wind Turbine Location Alternatives

Several locations at TRACEN were considered for the placement of the two proposed turbines.

The following siting criteria were used to select the initial locations from which the preferred locations were selected:

- Locations should have readily available access to the existing utility grid, allowing connection to the turbine with minimal disturbance;
- Locations should be readily accessible to existing roadways for construction purposes, and to minimize disturbance during construction;
- Locations need to have sufficient space to allow construction and elevation of the towers;
- The turbines should be located in areas that are developed (to reduce potential environmental impacts) but would not cause significant noise impacts or potential impacts to aesthetics.
- Turbines should not be located too close together because of "wind shadowing" effects, where one turbine blocks the wind flow to the other, or an adjacent building or tower acts to influence air flow to the turbine; and
- Turbines should be located to facilitate two separate tie-in points of 2-MW each, thus allowing a 4-MW project

Subsequent to production of the Draft EA, the following additional criteria were added and used to determine that the originally proposed locations should be moved:

- Turbines should be located so that the minimum distance from the nearest building is equivalent to the tip height of the constructed turbine (i.e. the distance from the tower base to the tip of the blade). In this case, that distance is approximately 400 ft;
- Turbines should not be located in areas that may represent common flightlines for birds flying back and forth from the bay to harbor to the bay, based on avian observations during the 2009 study.
- The clearance from ground level to the bottom of the blades should be high enough to avoid common flightlines for birds.

Figure 2-2 shows potential locations considered for placement of the turbines that were evaluated against these criteria.

Table 2-4 summarizes the various on-site wind turbine locations considered from the perspectives of logistics, technical feasibility and environmental impacts. Originally locations E-Alt and D were determined to be the most feasible locations and have the fewest environmental

impacts. However, based on evaluation of potential sites against these new criteria it was determined that two new locations were required.

Location E-Alt was originally selected for further analysis because it has the least potential for environmental impacts, and the USCG has considerable flexibility within that area as to where the tower can be precisely located. This location was ultimately moved to the Perchard Avenue 1 location, about 175 ft away because it is further from existing structures and will be more logistically feasible for the USCG to construct and implement. The environmental impacts at this location are considered nearly identical to those originally evaluated at location E-Alt.

The Perchard Avenue 1 location was selected from other qualifying locations based on the following factors:

- It is located in a developed area but has approximately one times the maximum tip height (MTH) setback distance between the wind turbine and the buildings;
- It is not located within or adjacent to significant bird or bat habitat, and is located well away from any wetlands or the southern shoreline areas that would attract wildlife; the northern shoreline is developed as a location for mooring USCG vessels.
- It is not proposed for redevelopment.

Locations B, C and D were further considered for locating the second turbine. These locations would all be technically practicable from the perspective of their proximity to a second tie-in location that would allow net metering to occur at two locations. New Jersey laws limit net metering to 2-MW per meter, so serving additional loads via the second tie-in location doubles the amount of wind capacity that can be installed. Of the locations reviewed, Location D was originally considered to have the least potential for environmental impacts, since it is near the Main Gate of TRACEN, an area of human activity that should help discourage bird impacts. However, further engineering analysis indicated that the proximity of this location to occupied buildings would not make it a feasible alternative. As a result it was moved to the Buoy Yard 1 location (along the bay shoreline about 1200 ft away from the TRACEN entrance), but still in an area where avian impacts would be minimal.

The following is a summary of remaining locations evaluated and rejected.

Location C is desirable from the perspective that it would be the least visible of all locations; however, this location is in close proximity to Poverty Beach and adjacent breeding and migratory bird habitat. Location B is located adjacent to the Day Care center and as a result there could be low level impacts to that facility from “flickering” effect of the blades blocking out the sun from entering the building. Also, there is an increased possibility of bat impacts at that location due to its proximity to a tree line southwest of the Day Care Center.

Several locations initially considered were rejected on the basis of an initial screening and are shown on the map but not discussed in the table. Locations F and G are both located near the former airstrip in the southeastern portion of the site. These locations were rejected due to the increased likelihood of avian mortality from the wind turbine blades, since they are located in areas that provide quality habitat for migratory passerines and birds such as peregrines that feed on them. Location H is an open lawn located in the northeastern part of TRACEN, which is the

site of a proposed USCG building. Other locations on site might be technically practicable but are actively used by the USCG for training, administrative, navigational or recreational purposes.

Table 2-4. Summary of On-Site Wind Energy Location Alternatives

	Site A	Site B	Site C	Site D	Site E	Site E alt	Buoy Yard 1	Perchard Avenue 1
Location	Near Switch 8 (north of Munro, across from GSK)	West of Child Development Center (CDC)	South of Track	NE of Water Tower	Near Switch 8 (NE corner of Harvard and Munro)	Near Hazmat Storage (NW corner of Harvard and Munro)	Near Buoy Yard adjacent to asphalt lot near former dredged material pile.	Approximately 175 ft SE of Site E Alt
Pros	• Minimal disruption during construction & operation • Good construction access, sufficient space • Low electrical connection cost	• Facilitates >4MW WTG capacity • Good construction access, sufficient space • Low electrical connection cost	• Facilitates >2MW WTG capacity • Minimal disruption during construction & operation • Good construction access, sufficient space	• Facilitates >4MW WTG capacity • Low environmental impact • Good construction access, sufficient space • Low electrical connection cost	• Preliminary screening indicated low environmental impact • Minimal disruption during construction & operation • Good construction access, sufficient space • Low electrical connection cost	• Preliminary screening indicated low environmental impact • Minimal disruption during construction & operation • Good construction access, sufficient space	• Minimal disruption during construction & operation • Good construction access, sufficient space • Less visibility from Poverty Beach and other locations • Adequate setback from occupied buildings	• Like Site E-Alt there is low environmental impact • Minimal disruption during construction & operation • Good construction access, sufficient space • Adequate setback from occupied buildings
Cons	• Avian risk: 4-5 • Occasional wind shadowing if install 2 WTGs in the vicinity (e.g., Site E or E alt) • Need to run lines to main switchgear or medical feeder if more than 2-MW is installed	• Avian risk: 4 - 5 • Possible bat risk • Moderate noise at CDC • Flicker at CDC, Medical • Disruption of CDC during construction	• Avian risk: 4-5 • Visible from Poverty Beach • Need to run lines to main switchgear or medical feeder	• Avian risk: 1-2 • Limited construction space, parking lot disruption • Higher visibility from Route 9 • Insufficient setback from occupied buildings.	• Avian risk: 1-3 • Occasional wind shadowing if install 2 WTGs in the vicinity • Need to run lines to main switchgear or medical feeder if more than 2-MW is installed • Insufficient setback from occupied buildings.	• Avian risk: 1-2 • Occasional wind shadowing if install 2 WTGs in the vicinity • Higher visibility from Poverty Beach • • Insufficient setback from occupied buildings.	• Avian risk 1-3; • Need to run lines to main switchgear or medical feeder if more than 2-MW is installed	• Avian risk: 1-2 • Occasional wind shadowing if install 2 WTGs in the vicinity • Possible flicker at nearby Seamanship Building. • Need to run lines to main switchgear or medical feeder if more than 2-MW is installed
Other Notes	• Some flexibility to move site around in vicinity (e.g., to reduce impact, minimize wind shadowing, etc)	• CDR may not approve this site due to impacts on CDC	• Closest to off-site land developed areas and shore (bird and bat habitats)	• Site WTG in existing parking lot to minimize wind shadowing from water tower •	• Some flexibility to move site around in vicinity (e.g., to reduce impact, minimize wind shadowing, etc.)	• Some flexibility to move site around in vicinity (e.g., to reduce impact, minimize wind shadowing, etc.)	• Some flexibility to move site around in vicinity (e.g., to reduce impact, minimize wind shadowing, etc.)	• Slightly less visible than other sites as it is located more toward the interior of TRACEN

Note: Preferred Locations are indicated by shaded columns.

CHAPTER 3
AFFECTED ENVIRONMENT

3.1 INTRODUCTION

This section presents the existing environmental conditions that would potentially be affected by the proposed action. This section is organized by the individual resources that would potentially be impacted by the proposed action or other foreseeable alternatives. The study area for the description of the affected environment consists of TRACEN, with emphasis on those specific sites that are proposed for disturbance by the proposed project.

In accordance with the scope of work for this EA, much of the information used to prepare this section was compiled from previous studies in the area:

- *Draft Final Integrated Natural Resources Management Plan and Environmental Assessment*, U.S. Coast Guard TRACEN, Cape May, New Jersey, prepared by Engineering-Environmental Management, Inc., August 2002.
- *Supplemental Program Environmental Assessment: National Distress and Response System Modernization Project*, prepared for the U.S. Coast Guard by URS Corporation, September 2002.
- *Lower Cape May Meadows – Cape May Point, Feasibility Study*, U.S. Army Corps of Engineers, August 1998.

This information was updated as necessary by primary sources such as the Phase I avian study and follow up Avian Study conducted by Curry and Kerlinger, LLC, and more recent environmental data where appropriate.

3.2 SITE CHARACTERISTICS

3.2.1 Topography

Topography refers to the change in vertical elevation of the earth's surface across a given area, and is determined by the type of underlying bedrock, the geology of the area, and the extent the landscape is dissected by streams (USDA-NRCS 2002). Topography is relevant to this EA because differences in topography can result in differences in drainage, local climate, and the extent of coastal flooding. Topography can influence both engineering design (e.g., steep slopes are inappropriate for development) as well as aesthetics (e.g., wind turbine on a mountain top may be more noticeable compared to the surrounding area).

Figure 1-1 is a U.S. Geological Survey topography map of TRACEN, at a scale of 1:24,000. As is evident from Figure 1-1 and site photos presented in Appendix C, the topography of TRACEN is flat, with an elevation change of less than 10 ft across the entire 300-acre site. This is consistent with the surrounding area, as the topography of Cape May County is flat relative to other portions of the state located further north and west. The regional topography is influenced by the fact that Cape May County falls within the Outer Coastal Plain province of New Jersey, a region of sandy soils that was part of an ancient beach during the Tertiary Period.

3.2.2 Geology/Seismic Considerations

Geological resources refer to the substrate of the area that can influence engineering considerations as well as seismic properties of the environment. Seismic properties are not a major issue along the eastern seaboard, but the geology of the area influences the necessary piling depths required for the proposed project.

Like much of southern New Jersey, the Cape May peninsula is located within the Outer Coastal Plain Physiographic Province. Surface soils consist of deep sands overlying clay and gravel substrate. The Cape May Formation covers most of the region, resting over the Cohansey Formation. These formations are composed of sand and gravel and smaller amounts of silt and clay. The Cape May Formation ranges in thickness from a few ft to 130 ft (USDA NRCS 2002).

The surface geology of the area contains unconsolidated deposition that reflects the periglacial conditions of the region. The glaciers did not reach as far south as Cape May County, but the melt water from the glaciers is believed to have covered almost the entire county, which affected the geology of the area. Rounded quartzose gravel that is believed to have been smoothed by these glacial waters during the Pleistocene Age can be found in all areas of Cape May County in varying abundances (Dames and Moore 1993, Dames and Moore 1994, USDA-NRCS 2002).

3.2.3 Soils

The USDA's Soil Conservation Service (SCS) (subsequently renamed the Natural Resource Conservation Service [NRCS]) mapped and classified TRACEN's soils in 2002 (NRCS 2002). Figure 3-1 depicts the soil geography of the Installation as determined by the NRCS 2002 survey. Nearly all of the soils within the study area were formed in unconsolidated geologic deposits, reworked unconsolidated deposits, or in organic deposits probably of the Pleistocene Age. Melt waters from the glaciation of the Pleistocene Age are thought to have covered all of the area and mixed the materials of the older marine deposits (USDA-NRCS 2002).

The predominant soil type at TRACEN is Psammaquents (PstAt). Three other soil types, Beach (BEADV) urban land-Psamments, sulfidic substratum complex (USPSAS) and urban land-Psamments, wet substratum complex (USPSBR) are also located within the study area (USDA NRCS 2002). Table 3-1 provides a summary of the Installation soil types and their associated properties.

Table 3-1. Properties of the Soil Types Found at TRACEN

Map Unit Symbol	Map Unit Name	Drainage	Slope[1]
PstAt	Psammaquents, sulfidic substratum	Frequently flooded	0-3%
USPSAS	Urban land-Psamments, sulfidic substratum complex	Occasionally flooded	0-2%
USPSBR	Urban land-Psamments, wet substratum complex	Rarely flooded	0-8%
BEADV	Beaches	Very frequently flooded	0-15%

Source: NRCS 2002, USDA-NRCS 2002

[1] Slope is the average grade of a particular phase in a soil series. Phases are divisions of soil series defined by differences in textural class, slope degree of erosion, stoniness, or depth to bedrock.

The Coastal Beach-Urban Land Complex (CU) is equally distributed within the undeveloped coastal beaches and coastal beach areas that are utilized for residential and commercial purposes. These soils are very low in fertility and organic content, although they have naturally excessive drainage. This soil complex generally consists of fill material that ranges from 2 to 4 ft in thickness (Dames and Moore 1994, USDA-NRCS 2002).

Urban land on TRACEN consists of Sandy Fill Land (FL) where the surface is covered with asphalt, concrete, buildings, or other impervious materials. These soils are sandy, infertile, have low available water capacity, rapid permeability, and low organic-matter content. Vegetation that is not tolerant to sandy, droughty sites is difficult to establish unless topsoil is added to the area.

Only a small portion of TRACEN contains Sandy Fill/Organic Substratum (FM). Due to the alterations from diking, dredging, and filling, the soil has changed and dredged materials range from fine sand to coarse sand and gravel as much as 2 inches in diameter. Fill materials average about 3 to 5 ft in depth, with a maximum possibly reaching 20 ft. These soils have rapid permeability and the available water capacity is low. The organic-matter content and natural fertility of the area is low, with little to no vegetation (USDA-NRCS 2002).

3.2.4 Hydrology

Water resources include surface water and groundwater environments. Water resources (water quality and quantity) are protected and regulated by Federal statutes and EOs, as well as State and local regulations and directives. Water resources are important from the perspective of hydrodynamic issues such as flooding, as well as water quality and wildlife habitat.

The Cape May Formation is part of an undifferentiated hydrogeologic unit. The underlying Kirkwood-Cohansey aquifer system includes the confined Cohansey Sand (Zapecza, 1989).

Because most of TRACEN is underlain by coarse-grained, high permeability surface soils, with the exception of the waterfront areas along Delaware Bay and the adjacent harbor area, there are no significant water bodies located on site. Water enters the site primarily in the form of precipitation and given the high permeability of the sandy soils, the substrates in the area are saturated by shallow groundwater that never reaches the surface.

The hydrology of the site is influenced by manmade structures; precipitation falling on impervious surfaces such as asphalt roads and parking areas, concrete sidewalks, and rooftops does not immediately infiltrate the soil but travels to other locations in the form of runoff. While the stormwater runoff system flows into the Delaware Bay, some areas on TRACEN may receive runoff directly from roadways, which contributes to precipitation enough to form wetlands (see Section 3.2.5.2).

The principal hydrological feature affecting the site is Delaware Bay, which forms the southern boundary of TRACEN. TRACEN, like most of southern Cape May County, falls within both the 100-year and 500-year floodplains. The 100-year flood, or intermediate regional tide, would have an elevation of 10.0 ft above mean sea level. The 500-year flood, or standard project tide, would have an elevation of 14.0 ft above mean sea level. The September 1944 hurricane that struck New Jersey had a tide 8.0 ft above mean sea level.

In a 100-year flood, or intermediate regional tide, all of TRACEN would be flooded. In a 500-year flood, or standard project tide, all of the region, including the protective barrier dunes, would be underwater. In either event, virtually all the buildings at TRACEN would be destroyed or severally damaged. Federal Emergency Management Agency (FEMA) has not included TRACEN in current Flood Insurance Rate Maps (FIRM); however, lower elevations inland of TRACEN have been designated in the 100-year floodplain.

3.2.5 Biological Resources

The following sub-sections summarize the biological resources potentially affected by the proposed project: vegetation, wildlife, (with emphasis on migratory birds and bats), threatened and endangered species, and wetlands.

3.2.5.1 Vegetation

Figure 3-2 is a map of the vegetative communities of TRACEN. As can be seen on the map, the majority of the installation has been developed. The remaining vegetated areas provide habitat for wildlife, and warrant description as a basis for assessment of potential impacts. Vegetation communities at TRACEN can be characterized as developed areas, forested, beach, dunes, and wetlands (Dames and Moore 1994).

Developed Area. This community includes disturbed roadsides, fields, lawns, waste places, and even some wetland areas. The most abundant species in both wetland and upland sites in the ruderal community is the common reed (*Phragmites australis*). This plant has colonized many disturbed sites. Old-field and established forested communities have succeeded to common reed stands (Dames and Moore 1994). Exotic weedy species such as Johnson grass (*Sorghum halapense*), Japanese honeysuckle (*Lonicera japonica*), bull thistle (*Cirsium vulgare*), sheep sorrel (*Rumex acetosella*), cat's-ear (*Hypochoeris radicata*), and curly dock (*Rumex crispus*) are also common in this community (Dames and Moore 1994).

Forested Community. The forested communities on TRACEN represent small remnants of this habitat type. These communities are generally in transition from primary to secondary successional forests and support a variety of canopy and sub-canopy species. The canopy of the forested communities is dominated by red maple (*Acer rubrum*), sweetgum (*Liquidambar styraciflua*), Japanese Black Pine (*Pinus thunbergiana*), London Plane (*Platanus acerifoilia*) and red cedar (*Juniperus virginiana*). These areas are located around the southern periphery of TRACEN.

The sub-canopy of these forested communities supports wild cherry (*Prunus pensylvanicum*), multiflora rose (*Rosa multiflora*), blackberry (*Rubus sp.*), and sassafras (*Sassafras albidum*).

Scrub-Shrub Community. This community consists of old field areas in the southeastern portion of the site near the former airstrip, and areas along the western site boundary that were formerly mowed but have been left to regenerate woody vegetation. Dominant species in these areas include wax myrtle (*Myrica cerifera*), bayberry (*Myrica pensylvanica)*, blackberry (*Rubus* sp.), multiflora rose (*Rosa multiflora*) with sapling red cedar (*Juniperus virginiana*) and black cherry (Prunus pensylvanicum). Goldenrods (Solidago spp.), little bluestem (*Schizachyrium scoparium)* and other old field grasses are present in these areas as well. In wetter areas silky

dogwood (*Cornus amomum*) and saplings of red maple (*Acer rubrum*) are evident as well. Common reed (*Phragmites australis*) is invading many of these areas as well and is interspersed with typical old field species, and occasional remnant groundsel-tree (*Baccharus halmifolia*) bushes.

Beach Community. Beach communities are limited to the undeveloped area along the Delaware Bay shoreline along the southern edge of TRACEN. Plants in the beach community must endure extreme conditions, including the rigors of storms and the stress of dehydration, and therefore tend to be sparse. Species that have adapted to these conditions at the TRACEN include American searocket (*Cakile dentula*), coast-blite goosefoot (*Chenopodium rubrum*), and beach-heath (*Hudsonia tomentosa*).

Dune Communities. This community is limited to a narrow fringe between the shoreline and upland areas along the southern fringe of TRACEN. The plants supported in this community are farther away from the ocean than the beach community and more sheltered from the elements. Therefore, more and diverse plant species colonize this community. Primary and secondary dunes are dominated by beachgrass (*Panicum amarum*), bitter panic grass (*P. amarulum*), American beachgrass (*Ammophila breviligulata*), American wormseed (*Chenopodium ambrosioides*), seaside goldenrod (*Solidago sempewirens*), bayberry (*Myrica pennsylvanica*), and black cherry (*Prunus serotina*) (Dames and Moore 1994).

The vegetation in the vicinity of the two proposed wind turbine locations (Perchard Avenue and Buoy Yard) consists of mowed lawn and gravel parking lot with common reed and some young red cedar and other shrubs, respectively.

Wetland plant communities are discussed in Section 3.2.5.2 below.

3.2.5.2 Wetlands

The function of a wetland is the result of the interactions among the geology, soil, water, and vegetation within a watershed. Remaining wetlands at TRACEN provide important habitat for many plant and animal species and provide essential nesting, migratory, and wintering areas for many bird species.

Field wetland delineations were conducted at TRACEN in 1993 and 1994 (Dames and Moore 1993, Dames and Moore 1994) to identify Federal and State jurisdictional wetlands on the property. Figure 3-3 shows the distribution of wetlands on site, as shown in the New Jersey Department of Environmental Protection (NJDEP) Geographic Information Systems (GIS) database. In addition, Dames and Moore performed a wetland delineation of the site in 1993. The extent of wetlands was field verified during a site walkthrough by Weston in October 2008, wherein areas potentially proposed for tower installation were evaluated in the field.

Most of the wetlands on the site are considered palustrine (freshwater) in nature, as described by Cowardin, et al. (1979). The palustrine system includes all non-tidal wetlands, all such wetlands that occur in tidal areas where the salinity due to ocean-derived salts is below 0.5 parts per million (ppm), and those that lack active wave-formed or bedrock shoreline. While most of the wetlands identified by Dames and Moore were palustrine emergent wetlands dominated by herbaceous plants, some palustrine scrub/shrub wetlands, dominated by broad-leaved deciduous

shrubs, also occur to a limited extent at TRACEN (Dames and Moore 1993, Dames and Moore 1994).

A total of 27 acres of wetlands, were identified at TRACEN. Table 3-2 identifies the wetland types at TRACEN and their descriptions based upon the Cowardin Classification System. A complete description of the delineated wetland sites is available in the 1993 and 1994 wetland delineation reports (Dames and Moore 1993, Dames and Moore 1994).

Table 3-2. Wetland Types at TRACEN

Cowardin Wetland Classification	Ecological System	Class	Water Regime
PSSlB/PEM 1B	Palustrine	Shrub-Scrub (Broad-leaved Deciduous)/ Emergent (Persistent)	Saturated, Frequently Flooded
PEM1B	Palustrine	Emergent (Persistent)	Saturated
PEM1C	Palustrine	Emergent (Persistent)	Seasonally Flooded
PEM1Y	Palustrine	Emergent (Persistent)	Semi-permanently Seasonally Saturated
E2EM1P	Estuarine, Intertidal	Emergent (Persistent)	Irregularly Flooded by Tides
E2SS1P	Estuarine, Intertidal	Scrub/Shrub	Irregularly Flooded by Tides
E2EM1P/E2SS1P	Estuarine, Intertidal	Emergent (Persistent)/ Shrub-Scrub (Broad-leaved Deciduous)	Irregularly Flooded by Tides
M2BB	Marine, Intertidal	Beach/Bar	Tidal
MODD	--	Disturbed	--
MODL	--	Managed	--

Source: Dames and Moore, 1993, 1994

During the field walk conducted by Weston in 2008, it was noted that many of the areas described as emergent wetlands by Dames and Moore are no longer mowed and are thus now dominated by shrubs and saplings of wetland species such as silky dogwood (*Cornus amomum*) and red maple (*Acer rubrum).* Slender flatsedge (*Cyperus filicinus*) dominates one of the palustrine wetland units that are frequently mowed, providing nearly 66 percent cover (Dames and Moore 1994). In addition to slender flatsedge, saltmarsh false-foxglove (*Agalinis maritima*), and beach sea-purslane (*Sesuvium maritumum*) occurred in these maintained wetlands.

Estuarine wetlands are associated with the narrow fringe along the Delaware Bay shoreline. The estuarine wetland system at TRACEN supports species indicative of salt marshes. These are semi-enclosed areas where seawater is diluted by freshwater, and where tides play a significant role in vegetation distribution. Saltmarsh cordgrass (*Spartina alterniflora*) occupies the areas between mean low water and mean high water marks as it has a high tolerance for salt and is able to survive in a somewhat submerged state. Common associates of this plant, growing in the upper end of the intertidal zone, are saltmarsh camphor-weed (*Pluchea purpurascents*), Carolina sea-lavender (*Limonium carolinianum*), glassworts (*Salicornia biglovii* and *S. europea*), and white sea-blite (*Suaeda maritima*) (Dames and Moore 1994).

Just above the mean high water mark, saltmeadow cordgrass typically dominates, forming dense mats that prevent the growth of other species. In areas where the soil is heavily saturated or salinity is high, seashore saltgrass (*Distichlis spicatu*) occurs with saltmeadow cordgrass, or even replaces it forming monotypic stands (Dames and Moore 1994). Further upslope from the mean high tide, where fresh water intrusion increases, shrubby wetland species may occur, including marsh-elder (*Iva frutescens*) and groundsel-tree (*Baccharis halimifolia*) (Dames and Moore 1994). Just as in the palustrine system, these wetlands support a variety of plant species. Common reed, or *Phragmites*, widely recognized as an invasive, noxious species in many other states, has also become extensively established in the wetlands, and even uplands, of TRACEN.

3.2.5.3 Wildlife

3.2.5.3.1 Wildlife Habitat

The remaining vegetation at TRACEN provides an indication of the potential use of the site by wildlife. The beach habitat at TRACEN is probably the most significant wildlife habitat type. It provides natural wildlife habitat for numerous species, including two threatened and/or endangered species. The piping plover and least tern have used the barrier beach as nesting and foraging habitat. The habitat results from the normal coastal processes that renew and create the beaches along the Atlantic Ocean shoreline.

Freshwater wetlands account for some of the natural wildlife habitat at TRACEN. They provide shelter and foraging, nesting, and breeding habitat for birds, mammals, reptiles, amphibians, and insects. However, their most significant use is probably as stopover habitat for migratory passerines, as well as raptors that feed upon them. The remaining undeveloped areas also provide corridors for wildlife movement and migration.

The wooded areas along the periphery of TRACEN are not large enough to support species that require large tracts of interior forest to meet their life requirements. However, they do provide excellent edge habitat for breeding and migratory passerines, especially those favoring edge and old field habitats.

Although TRACEN is located on the ocean and recreational fishing access is permitted from the southern jetty, the USCG does not have management responsibility of the fisheries. Recreational fishery species that are likely to occur off the shore of TRACEN include summer flounder (fluke) (*Paralichthys dentatus*), porgy (scup) (*Calamus* spp.), Striped Bass (*Morone saxatilis*), Weakfish (*Cynoscion regalis*), Atlantic Croaker (*Micropogonias undulates),* Tautog or Blackfish, *(Tautoga onitis),* Atlantic herring (*Clupea harengus),* Sea bass (*Centropristis striata,*winter flounder (*Pleuronectes americanus*), bluefish (*Pomatomus saltatrix*), cod (*Gadus morhua*), Pollock (*Pollachius virens*), lobster (*Homarus americanus*), blue crab (*Callinectes sapidus*), and shark (NJDFW 2000).

The sections below summarize potential use of TRACEN for wildlife, broken down by different taxonomic groups.

3.2.5.3.2 Birds

Curry and Kerlinger, LLC have prepared a Phase I Avian Risk Assessment of the proposed wind turbine project, which is included as a CD in Appendix A. The Phase I Avian Risk Assessment provides a detailed discussion of existing conditions, as determined by a literature review and site visit by qualified field biologists familiar with local conditions. Also determined was the potential level of risk to the species that are known to occur at the site. The latter is based on a review of the literature regarding empirically determined impacts to birds at onshore and offshore wind plants in Europe and North America and on the bird life present at the Project site. Appendix A includes a list of bird species with the potential to occur on TRACEN (taken from the 2002 Natural Resources Management Plan for TRACEN). There is a substantial amount of information available regarding the use of the Cape May peninsula by birds, including Breeding Bird Surveys, which have contributed to this list. In the table, breeding bird species are noted with an asterisk, and abundance is noted as (C) – common, more than 20 individuals per day; (F) - fairly common, usually seen, 5 to 20 individuals per day; (U) – uncommon, seen in limited numbers, 1 to 4 per day; (S) – scarce, usually present, but not seen daily; (R) - rare, seen only a few times per season; and (V) – very rare or very infrequent, fewer than 1 record per season. Other species whose ranges are primarily to the south or west may also be sighted at TRACEN as transients, or, less likely, as seasonal breeders.

In addition, Curry and Kerlinger, LLC performed a two-day field survey at TRACEN in October 2008, during the migration period for passerines and raptors. They recorded 103 species of birds at the facility or overhead, the list of which is presented in Appendix A.

Curry and Kerlinger, LLC also compiled a list of species recorded during Christmas Bird Counts (CBC) from 1999 to 2008, and from the New Jersey Breeding Bird Atlas.

Finally, in response to comments from the U.S. Fish and Wildlife Service and New Jersey Audubon Society on the Draft EA, USCG contracted Curry and Kerlinger, LLC to design and conduct field studies to obtain additional site-specific data on the use of the potential turbine locations and areas surrounding those locations by birds. These studies were used to augment the Phase I Avian Risk Assessment prepared by Curry and Kerlinger, LLC and focused on site-specific avian use. Appendix A includes the January 2010 report entitled *Avian Abundance and Use Survey, Cape May Wind Turbine Project*.

The objectives of the investigation were to:

- Quantify the types and numbers of birds that use the airspace and habitats within and adjacent to TRACEN;
- Determine the behavior of migrant and resident birds as they fly over or alight at the site and vicinity; and,
- Use data to determine likely collision risk and assess the likelihood of biologically significant impacts.

The abundance and avian use study was conducted by two expert field ornithologists (James Dowdell and Clay Sutton) from 23 April to 1 December 2009, during which time they collected data at six different observation points at TRACEN. A total of 247,637 birds distributed amongst 208 species were recorded over 468 hours of observation, encompassing 78 days. In

addition to the number and species of birds observed, data were recorded on the height they were flying, direction of flight, type of flight (direct, hunting, lingering, perching, loafing), and the habitat over which the birds were recorded.

Breeding Birds

Relatively few species and individuals are likely to breed at the proposed turbine sites on TRACEN, because these areas are mostly developed with buildings and lawns, and the Buoy Yard location will be in an area of common reed adjacent to an asphalt parking lot. Except possibly for Killdeer, no birds are likely to nest on the mowed lawns surrounding the proposed turbine placements.

There is some scrub-shrub habitat in the southeastern portion of the site that provides habitat for common breeding passerines. Adjacent coastal scrub habitat fringing the site may also be appropriate nesting habitat for some special-status passerines, such as the New Jersey special-concern Yellow-breasted Chat and Brown Thrasher and *Yellow WatchList*[1] Willow Flycatcher and Prairie Warbler. It is also possible that the New Jersey threatened Cooper's Hawk nests in one of the forests on site.

Least terns and piping plovers are known to breed in the vicinity of the site, and are discussed in Section 3.2.5.4. below. In some years, Least Terns have nested on the beach at the Base and piping plover currently is nesting on beaches across the inlet from the Base. The latter species may in some years nest on the beaches below the canal, on or adjacent to the Base.

Migratory and Wintering Birds

The geography of the Cape May peninsula and surrounding area is such that it acts as a funnel for migrating birds along the Atlantic flyway (Figure 3-4). Millions of birds annually stop at or fly through Cape May during fall migration; the former awaiting favorable weather before crossing the bay. Similarly, during spring migration many birds stop and rest after crossing Delaware Bay on their trip north. TRACEN study area thus falls within one of the most prominent locations along the Atlantic flyway for migrating songbirds, waterfowl, shorebirds, and raptors. The Atlantic flyway route from the northwest is of great importance to migratory waterfowl, while portions of the peninsula along Delaware are of international importance to migrating shorebirds such as red knot.

[1] The recently published *2007 WatchList for United States Birds* highlights all the highest priority birds for conservation in the United States. See Section 4.1 discussion.

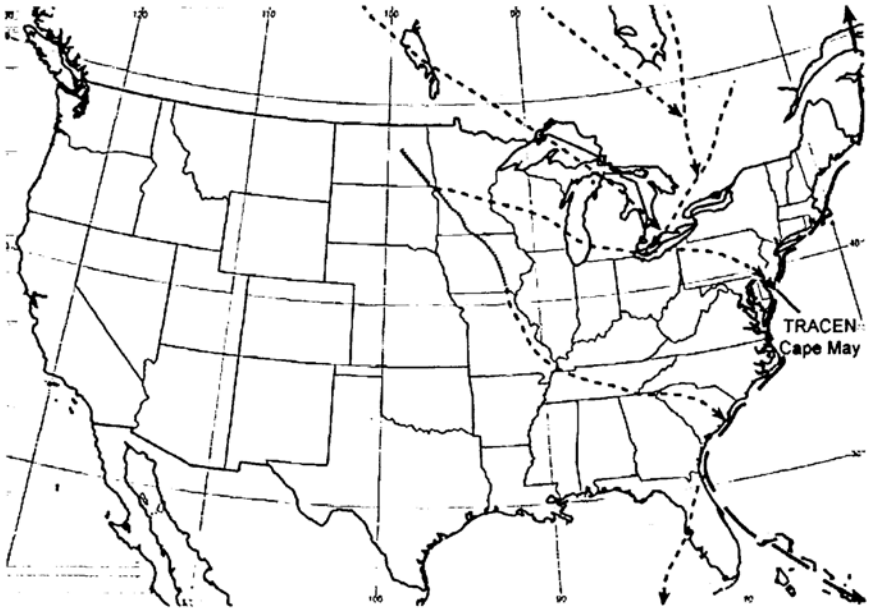


Figure 3-4. Diagram of the Atlantic Flyway in Relation to TRACEN

As a result, large numbers of migrating songbirds, raptors, and waterbirds occur in the vicinity of TRACEN, particularly during fall migration. The nocturnal migration of songbirds over Cape May has been documented as highly concentrated by direct visual studies. Coastal "fallout" events regularly occur, as birds aloft in sight of land redirect themselves to the nearest habitats to rest and feed and birds flying overland seek havens in habitats on-site and nearby. These fallout events are most impressive in fall on heavy flight nights following cold fronts, when birds are battling headwinds to return to shore. Under those conditions, large numbers of birds may be expected to use the scrub-shrub habitat and coastal shrub thickets located in the southeastern portion of the site and in the surrounding area along the eastern boundary.

This phenomenon has been documented at nearby Sewell Point (off Pittsburgh Avenue in Cape May), where passerine numbers were found to be as large as those documented elsewhere south of the Cape May Canal, including Higbee Beach. Early morning dispersal flights (also known as morning flights) are also expected to occur from these habitats and off-site, as songbirds move at relatively low altitudes along the barrier islands or inland to settle into suitable habitats for resting and feeding. Fallouts also occur in spring, but the numbers of migrants involved are usually not as great as in fall and their dynamics differ. Daytime-migrant songbirds may also be expected to migrate along the barrier beaches, sometimes in large numbers.

CBC data indicates that the Cape May peninsula has a high diversity of waterbirds, raptors, and special-status species in winter. Regarding TRACEN, the New Jersey endangered Peregrine Falcon is likely to roost on site, including on the water tower in the northeastern corner near proposed location D. The New Jersey special-concern Horned Lark may occasionally be found on the lawns, and the special-concern Yellow-breasted Chat may turn up in the coastal shrub thickets. Around the site, however, many special-status and other birds may occur within the site vicinity. Regularly occurring special-status species would include the threatened Cooper's Hawk, special-concern Northern Harrier, Sharp-shinned Hawk, American Oystercatcher, Sanderling, (also *Yellow WatchList*), and Eastern Meadowlark, and *Yellow WatchList* Western Sandpiper, among others.

The following is a brief discussion of major species groups in the Cape May area.

Raptors. As summarized in the Phase I Avian Assessment (Curry and Kerlinger, LLC) the Delaware Bayshore of New Jersey is a major migration and wintering area for raptors. According to the Natural Heritage Program the site is located within a migratory raptor concentration area. In addition, the lower drainage areas of the Maurice and Cohansey Rivers and the Cumberland County coastal zone were found to support high densities of Black (*Coragyps atratus*) and Turkey Vultures (*Cathartes aura*), Bald Eagles (*Haliaeetus leucocephalus*), Red-tailed Hawks (*Buteo jamaicensis*), Northern Harriers (*Circus cyaneus*), Cooper's Hawks (*Accipiter cooperii*), Sharp-shinned Hawks (*Accipiter striatus*), Rough-legged Hawks (*Buteo lagopus*) and American Kestrels (*Falco sparverius*) in winter. Such high numbers and diversity of migrating and wintering raptors make the Cape May area exceptional and, perhaps, unique in eastern North America.

Cape May Point is world famous for its fall hawk migration. When winds are moderate to strong out of the west, northwest, and north large numbers of accipiters and falcons are known to migrate at relatively low altitudes along the Atlantic barrier beaches at Cape May and somewhat inland. These species include the New Jersey endangered Peregrine Falcon, threatened Cooper's Hawk, and special-concern Northern Harrier, Sharp-shinned Hawk, and American Kestrel. While migratory routes are more toward the western side of Cape May, individuals of many of these species may be expected to transit TRACEN. Spring migration of hawks does occur in Cape May, but these birds are not as numerous as in fall.

Wading Birds, Shorebirds, and Waterfowl. The wetland and beach habitats at TRACEN provide excellent habitat for some species of wading birds, shorebirds, and waterfowl. The American black duck (*Anas rubripes*), mallard (*Anas platyrhynchos*), double-crested cormorant (*Phalacrocorax auritus*), black, scoters (*Melanitta americana*), surf scoters (*Melanitta perspicillata*), white-winged scoters (*Melanitta deglandi*), great cormorant (*Phalacrocoracidae carbo*), long-tailed duck (*Clangula hyemalis*), red-breasted merganser (*Mergus serrator*), and common eider (*Somateria mollissima*) are waterfowl species commonly observed at TRACEN. The wetland communities of the region support moderate numbers of other migrating waterfowl, many of which remain throughout the winter. Species such as wood duck (*Aix sponsa*), blue-winged teal (*Anas discors*), green-winged teal (*A. crecca*), American wigeon (*A. americana*), mallard (*A. platyrhynchos*), gadwall (*A. strepera*), northern shoveler (*A. clypeata*), northern pintail (*A. acuta*), canvasback (*Aythya valisineria*), greater scaup (*A. marila*), lesser scaup (*A. affinis*), bufflehead (*Bucephala albeola*), and Canada goose (*Branta canadensis*) migrate throughout the region regularly. Common wading birds include great blue heron (*Ardea herodias*), snowy egret (*Egretta thula*), glossy ibis (*Plegadis falcinellus*), great egret (*Ardea alba*), black-crowned night heron (*Nycticorax nycticorax*), and some others (Cape May Bird Observatory 1997, P. Kerlinger personal observations).

The Avalon Seawatch, about 13 miles (21 km) northeast of Cape May has documented a large fall migration of seabirds, waterfowl, and other species along the New Jersey coast. This migration normally occurs over the ocean, but in northeast winds, birds such as cormorants fly over the barrier islands and even the adjacent marshes. Delaware Bay is of international significance as a shorebird stopover site, particularly in spring migration, when many species stage to feed on horseshoe crab eggs. At the mouth of the bay, where TRACEN is located, shorebird numbers are not as large as farther up the bay, but small to moderate numbers of the

New Jersey threatened Red Knot and special-concern Sanderling and Semipalmated Sandpiper (all *Yellow WatchList*) may be expected to roost and feed in the vicinity of TRACEN.

The Delaware Bay shoreline is a major shorebird staging area in North America, second only to the Copper River Delta in Alaska. Hundreds of thousands of shorebirds, nearly 80 percent of some populations, stop to rest and feed in this region during their spring migration from South America to their breeding grounds in the Arctic. The arrival of over 20 species of shorebirds coincides with the peak horseshoe crab spawning season. Horseshoe crab eggs provide an abundant source of food for these shorebirds to replenish their energy reserves during the spring migration. Common shorebird species observed during the spring migration include: sanderling (*Calidris alba*), semi-palmated sandpiper (*Calidris pusilla*), dunlin (*Calidris alpina*), semi-palmated plover (*Charadrius semipalmatus*), short-billed dowitcher (*Limnodromus griseus*), willet (*Catoptrophorus semipalmatis*), greater yellowlegs (*Tringa melanoleuca*), lesser yellowlegs (*Tringa flavipes*), black-bellied plover (*Pluvialis squatarola*), least sandpiper (*Calidris minutilla*), ruddy turnstone (*Arenaria interpres*), red knot (*Calidris canutus*), whimbrel (*Numenius phaeopus*), spotted sandpiper (*Actitis macularia*), and pectoral sandpiper (*Calidris melanotos*). Horseshoe crabs do not lay eggs in any numbers along the TRACEN facility shoreline, so shorebird concentrations like those on Delaware Bay do not occur.

Migrant Passerines. Over 100 species of neotropical migratory birds are known to occur in Cape May County (Cape May Bird Observatory 1997). Many of these species occur at TRACEN, likely in the available grassland, wetland, and forest habitat. The most important nesting species are those dependent upon the marshes and coastal island habitats, for example, seaside sparrow (*Ammodramus maritimus*), marsh wren (*Cistothorus palustris*), and sedge wren (*Cistothorus platensis*). Of these, only marsh wren may nest at TRACEN. A large number of birds nesting on or migrating through TRACEN are neotropical migrants (wintering in Central and South America).

3.2.5.3.3 Mammals

Despite the fact that much of the native vegetation supported at TRACEN has been disturbed or replaced with managed landscapes, a variety of mammals inhabit or use the habitat that is provided. Although surveys have never been conducted to identify species of mammals that inhabit or migrate through TRACEN, carnivores, ungulates, and small mammals are known to occur.

Carnivores. Carnivorous species that are common in this part of New Jersey, and have the potential to migrate through or inhabit TRACEN, include the red fox (*Vulpes vulpes*) and coyote (*Canis latrans*). These species are an important component to the local ecosystems. These species prey on rodents, rabbits, and insects providing a natural means of controlling potential pest populations. In addition, feral cats exist on TRACEN and in the surrounding residential communities. These feral cat colonies have the potential to severely impact bird and small mammal populations on the installation.

Omnivores. Omnivorous small mammals are perhaps the most abundant mammals on TRACEN due to their generalist ecological niche. Due to the limited contiguous grassland or forest habitats, mammals such as raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), and

Virginia opossum (*Didelphis virginiana*) constitute some of the more common mammals found on TRACEN.

Ungulates. Due to the small size of TRACEN and the limited amount of cover and browse for ungulate species, there is a limited potential for populations of ungulate species to inhabit TRACEN. White-tailed deer (Odocoileus virginianus) utilize the limited forage available at TRACEN. Deer are likely to occur in the developed and undeveloped areas of the Installation.

Small Mammals. Common small mammals with the potential to inhabit TRACEN include the gray squirrel (*Sciurus carolinensis*), eastern chipmunk (*Tamias striatus*), white-footed mouse (*Peromyscus leucopus*), eastern cottontail (*Sylvilagus floridanus*), and cotton mouse (*Peromyscus gossypinus*).

Bats. Nine species of bats occur with regularity in New Jersey. Six of these species are year-round residents, including the little brown myotis (*Myotis lucifugus*), northern myotis (*M. septentrionalis*), eastern small-footed myotis (*M. leibii*), Indiana myotis (*M. sodalis*), big brown bat (*Eptesicus fuscus*), and the eastern pipistrelle (*Perimyotis subflavus*). Two of these year-round residents are of conservation concern; the federally endangered Indiana myotis, known to inhabit the northwestern portion of the state, and the eastern small-footed myotis, a New Jersey State Species of Undetermined Status. The remaining three species, the eastern red bat (*Lasiurus borealis*), the hoary bat (*L. cinereus*), and the silver-haired bat (*Lasionycteris noctivagans*) are long-distance migrants and are found in New Jersey only during summer months and during the spring and fall migratory periods. Data from prior studies at wind turbine facilities suggests that these tree-roosting species are also the most likely to be impacted from construction of the proposed project (see Section 4.1.5).

Wolgast (1998) listed three species of bats as residents of the New Jersey Pine Barrens, the little brown myotis, big brown bat and the eastern pipistrelle. These resident species are the most likely to be found year round near Cape May. All three are insectivorous and roost in hollow trees or buildings. If present in the area, they would be expected to be found near woodland and wetland habitats where there is available roosting habitat, with suitable insect abundance to support their populations.

The distribution of Indiana myotis is often associated with cavernous limestone areas (Thomson, 1982) where abundant winter hibernacula are available. In New Jersey, this species uses only two or three caves, all man-made mines, located in the ridge and hill areas in the northwest portion of the state. Although Indiana myotis are known to migrate up to 532 km to reach their summer territory (Kurta and Rice, 2002), most migratory events in the northeast tend to be less than 50 km (Griffin, 1970; Hicks, 2003). During the summer months, adult females form reproductive colonies to raise their young. These ‘maternity’ colonies are generally located under exfoliating bark or in tree cavities (Kurta and Rice, 2002), although they are known to use man-made structures (Butchkoski and Hassinger, 2002; Carter, 2002). Roost trees are generally located in riparian, floodplain and bottomland forest habitat and they appear to have key characteristics that are generally independent of the tree species (Scherer, 1999). Specifically, roost trees are large (greater than 36 cm dbh), tall, near water, and in direct sunlight most of the day (Kurta et al., 1993: Menzel et al., 2001: Kurta and Rice, 2002). Foraging by the Indiana myotis is generally concentrated in riparian habitat, although there is a considerable amount of

research that suggests they are more diverse in habitat selection (Kurta et al., 1993: Menzel et al., 2001: Carroll et al., 2002).

The eastern small-footed myotis has an extensive distribution (from Ontario to New England, southward to Georgia and Westward to Oklahoma), although it is not considered common anywhere within its range. Although *M. leibii* is not federally protected, it is considered a species of management concern and has conservation status in most of the New England states and several states in the mid-Atlantic region. Although they appear to exhibit some flexibility in roost use, with some roosts reported from hollow trees, exfoliating bark, abandoned tunnels, and even human structures (Thomas, 1993; Best and Jennings, 1997), available data suggest that most small-footed bats use rock outcrops and talus slopes as maternity roosts during the summer months (J.P. Veilleux, Franklin Pierce University, unpublished data). Summer populations of eastern small-footed myotis appear to have a patchy distribution throughout their range, and activity is often concentrated around hibernacula (Thomas, 1993; Johnson and Gates, 2008). Spring migration patterns suggest that eastern small-footed myotis travel extremely short distances between winter hibernacula and summer roost areas; in Maryland, Johnson and Gates (2008) reported migration distances of between 0.1 and 1.1 km from hibernacula to summering locations for four female eastern small-footed myotis.

3.2.5.3.4 Reptiles and Amphibians

Due to the topographic and regional conditions present on TRACEN, several species of reptiles and amphibians have the potential to reside there. As with mammals, surveys to identify reptiles and amphibians have not been conducted at TRACEN. However, adequate habitat exists, primarily as freshwater wetlands, to support reptiles and amphibians at the Installation.

Characteristic amphibians at TRACEN include: Fowler's toad (*Bufo woodhousii fowleri*), eastern spadefoot (toad) (*Scaphiopus holbrookii holbrookii*), carpenter frog (*Rana virgaripes*), green frog (*Rana clamitans melanota*), spring peeper frog (*Pseudacris crucifer*), wood frog (*Rana sylvatica*), southern leopard frog (*Rana utricularia*), and pickerel frog (*Rana palustris*). Both northern leopard frog and wood frog have been previously reported on the site.

Snakes characteristic of the region include the northern redbelly snake (*Storeria occipitomaculata occipitomaculata*), eastern garter snake (*Thamnophis sirtulis sirtalis*), eastern ribbon snake (Thamnophis sauritus sauritus), eastern milk snake (*Lampropeltis triangulum triangulum*), eastern kingsnake (*Lampropeltis getula getula*), and black rat snake (*Elaphe obsoleta obsoleta*). Garter snakes have been previously reported on the site.

The eastern tiger salamander (*Ambystoma tigrinum tigrinum*) (State-listed as endangered), bog turtle (*Clemmys muhlenbergii*) (State-listed as endangered and Federally listed as threatened), timber rattlesnake (*Crotalus horridus horridus*) (State-listed as endangered), Cope's gray tree frog (*Hyla chrysoscelis*) (State-listed as threatened), and Northern pine snake (*Pituophis melanoleucus melanoleucus*) (State-listed as threatened) are rare reptiles and amphibians that occur in southern New Jersey, but have not been documented in the region.

3.2.5.4 Threatened and Endangered Species

The United States Fish and Wildlife Service (FWS) and NJDEP Division of Fish and Wildlife were contacted regarding the presence of threatened and endangered species in the geographic area of TRACEN pursuant to the requirements of Section 7(c) of the Endangered Species Act (*16 U.S.C. 1536*). Under the Endangered Species Act, an "endangered species" is defined as any species that is in danger of extinction throughout all or a significant portion of its range. A "threatened species" is defined as any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. The FWS has also presented an updated list of species that are regarded as candidates for possible listing under the Endangered Species Act. Although candidate species receive no statutory protection under the Endangered Species Act, the FWS believes it is important to advise Government agencies, industry, and the public that these species are at risk and may warrant protection under the Act in the future.

Responses from FWS and NJDEP Division of Fish and Wildlife have documented the presence of both State- and Federally-listed threatened and endangered species as occurring or which have the potential to occur in the area. In addition, Curry and Kerlinger, LLC. requested additional updated information in letters submitted on October 28, 2008.

The piping plover (*Charadrius melodus*), federally-listed as threatened and state-listed as endangered, and the least tern (*Sterna antillarum*), state-listed as endangered, have been confirmed as breeding populations at or near TRACEN by FWS and NJDEP Division of Fish and Wildlife. An active management program has been in place under the direction of TRACEN CMINST 16450 *Endangered Species Management Plan* (TRACEN 2001) for these species.

In addition to the piping plover and least tern, several federally and state-listed threatened and endangered species have the potential to occur at TRACEN but have not been confirmed. Seabeach amaranth (*Amaranthus pumilus*) has not been documented at TRACEN, but has been documented in Monmouth County, New Jersey and Upper Township, Cape May County, New Jersey. FWS also documents transient threatened and/or endangered species that migrate through the area. These species include, but are not limited to federally endangered roseate tern (*Sterna dougallii*) and state-endangered bald eagle (*Haliaeetus leucocephalus*) (breeding population only, the non-breeding population is state-threatened). NJDEP Division of Fish and Wildlife has documented occurrences of state listed wildlife in the region of TRACEN. The yellow-crowned night-heron (*Nyctanassa violacea*) and the black-crowned night-heron (*Nycticorax nycticorax*), both state-listed as threatened, have been documented in the region.

A list of threatened and/or endangered species as well as documented rare species adjacent to TRACEN is presented in Table 3-3. It should be noted that during the 2009 avian abundance and use survey conducted by Curry and Kerlinger, LLC, no federally endangered or threatened species were recorded from point count locations. While rare species have no specific legal protection under federal or state laws, these populations are monitored when practicable. Detailed information regarding threatened and endangered species known, or which have the potential to occur in the region is provided below.

Table 3-3. Federally and State-Listed Threatened and Endangered Species Documented on or in the Immediate Area of TRACEN

Common Name	*Scientific Name*	Federal Status	State Status
BIRDS			
Piping plover*	*Charadrius melodus*	T	E
Least tern*	*Sterna antillarum*		E
Bald eagle*	*Haliaeetus leucocephalus*		E(breeding) T (non-breeding)
Roseate tern	*Sterna dougallii*	E	
Black skimmer*	*Rynchops niger*		E
Black-crowned night-heron*	*Nycticorax nycticorax*		T
Yellow-crowned night-heron*	*Nyctanassa violacea*		T
Cooper's Hawk*	*Accipiter cooperii*		T
Red Knot	*Calidris canutus*		T (breeding)
Red-shouldered Hawk*	*Buteo lineatus*		E (breeding)
Osprey	*Pandion haliaetus*		T (breeding)
Peregrine Falcon	*Falco peregrinus*		E
VASCULAR PLANTS			
Seabeach amaranth	*Amaranthus pumilus*	T	

Source: FWS 2002, NJNHP 2002, Personal Observations of EA Team
Notes: * Documented as occurring at TRACEN
E - Federally- or state-listed endangered species
T - Federally-or state-listed threatened species

Piping Plover (Charadrius melodus)

A population of the federally-listed as threatened, and state-listed as endangered, piping plover (*Charadrius melodus*) is known to have bred at TRACEN. At TRACEN, piping plovers have historically bred along the southern shoreline area known as Poverty Beach (sometimes outside the TRACEN boundary). Table 3-4 summarizes the breeding records over the past 19 years.

Table 3-4. Number of Pairs of Piping Plovers at TRACEN

Year	Number of Pairs	Pairs Hatching Eggs	Chicks Fledged
1991	3	2	4
1992	6	4	2
1993	6	3	4
1994	7	6	9
1995	6	5	6
1996	7	4	6
1997	3	1	1
1998	3	2	5
1999	5	4	4
2000	5	2	5
2001	2	2	4
2002	4	2	3
2003	4	2	3
2004	1	1	1
2005	3	2	0
2006	0	0	0
2007	2	1	0
2008	1	0	0
2009	0	0	0

The breeding season begins when the adults reach the breeding grounds in late March- to late-April or in mid-May in northern parts of its range. Adult male piping plovers arrive in late March or early April prior to females, select beach habitats, and defend established territories against other males. There are a variety of reasons that piping plover populations have become threatened. Due to the nature of the bird's life history, it is particularly sensitive to growing human populations. Nest failures are most common due to predation, flooding, and unknown abandonment, other nest failures occur due to human disturbance, nonviable eggs, or unknown factors. These factors are the proximate causes of population declines, but the ultimate cause of the species decline is habitat destruction and modification due to human development and disturbance along the open dunes and beach fronts.

Least Tern (Sterna anfillarum)

The least tern (*Sterna antillarum*), state-listed as endangered, has historically nested on the beaches at TRACEN.

The least tern is migratory and breeds on gravel/sand bars along rivers, channels, and streams. Least terns nest in small colonies in shallow depressions scraped in an open sandy area, gravelly patch, or exposed flat. The nest is an inconspicuous, unlined scrape usually containing three brown spotted eggs. Egg laying and incubation occur from late May through early August. Least terns usually forage close to the nesting colony.

Curry and Kerlinger, LLC reported that a breeding colony of least terns was located on the oceanside beach adjacent to TRACEN in 2009. Because of this it was the most commonly recorded state-endangered species during their investigation.

Roseate Tern (Sterna dougallii)

According to Bean and Niles (2003), the following is a description of the Roseate tern in New Jersey:

"Although the Roseate tern has historically nested in New Jersey, breeding has not been documented since 1980. Consequently it is currently considered extirpated as a breeding species in the state. Roseate terns are extremely rare summer transients and very rare fall migrants in New Jersey, occurring from late August to early September. Migratory and summer transient roseate terns have been seen in recent years at Cape May, Avalon, Corson's Inlet, Holgate, Sedge Island and Sandy Hook." Most roseate terns migrate far offshore and because of this behavior, numbers seen in the Cape May peninsula number perhaps one per year by birders.

This species used to nest in salt marshes, barrier and other islands and similar coastal habitats. Currently, almost all roseate terns in the eastern U.S. nest on islands off the North Fork of Long Island, New York, and Cape Cod, Massachusetts. At TRACEN habitat may be present at Poverty Beach on the southern side of the installation, although such habitat is also available along much of the Jersey Shore.

Seabeach Amaranth (Amaranthus pumilus)

Seabeach amaranth has been documented in Monmouth County and Upper Township, Cape May County, New Jersey. This species has not been documented on TRACEN.

3.2.6 Cultural Resources

Cultural resources consist of prehistoric and historic sites, districts, structures, artifacts and any other physical evidence of human activities considered important to a culture, subculture, or community for scientific, traditional, religious, or other reasons. The National Historic Preservation Act (NHPA), as amended in 1992 (16 U.S.C. et seq.) and NEPA require the consideration of impacts on cultural resources either listed or eligible to be listed on the National Register of Historic Places (NRHP). Cultural resources can be divided into three major categories:

- Traditional cultural properties;
- Archeological resources; and
- Architectural resources.

3.2.6.1 Traditional Cultural Properties

Traditional cultural properties can include archeological resources, buildings, neighborhoods, prominent topographic features, plants, animals, and minerals that Native American or other ethnic groups consider essential for the persistence of their traditional culture. Resources generally must be greater than 50 years old to be considered for protection under existing cultural resource legislation. The significance of traditional cultural properties is often determined through consultation with the groups that are associated with the sites. There are no known traditional cultural properties at TRACEN**.**

3.2.6.2 Archeological Resources

Prehistoric site types that may be found at or near TRACEN may include fishing stations, shellfish middens, ceramic scatters, burials, lithic scatters, campsites, and villages. There have been limited archeological investigations in southern New Jersey. However, evidence of habitation dating back almost 12,000 years has been discovered in the area. During this time, changes in subsistence and settlement have altered from overhunting and commercial farming practices. A number of archeological sites have been recorded in Cape May County where most of the research has focused on the Pinelands (Bennett 2002). Research in historical archeology has focused on more famous sites in the north, such as Trenton. A 1994 study conducted by the United States Army Corps of Engineers (USACE) concluded that, due to previous high levels of ground disturbance, TRACEN is not likely to contain archeological resources that retain integrity (Dames and Moore 1994).

Nevertheless, under NEPA and CEQ regulations, an evaluation of the archaeological sensitivity of the proposed wind turbine footprints is required. This study, known as a Phase IA Archaeological Investigation, has been undertaken by Historical Perspectives, Inc. (HPI) in accordance with report guidelines issued by the New Jersey State Historic Preservation Office (NJ SHPO) (1996, 2000). The survey focused on TRACEN, since construction of a wind energy

project would be limited to sites chosen on TRACEN. The complete report is provided on a CD in Appendix B.

The Phase IA assessment of TRACEN Area of Potential Effect (APE) has indicated that prior to the early 20th century all of the proposed wind turbine sites were under marshlands of Cape May Sound. The likelihood of recovering precontact period archaeological resources underneath the marshland soil dating to the Paleo-Indian Period is low. Additionally, because historic use of TRACEN APE dates to post-1903, and because the military facility structures have been recommended not eligible for the State and National Registers of Historic Places, there should be no historic period archaeological resources within the APE. The only area of TRACEN that may have at one time had archaeological potential is the strip of beach along the southern edge of the base. However, large portions of this original beach have eroded away or were destroyed in the 1980s from a storm, and much of the existing beach area has been reconstructed using non-local soils.

Based on these conclusions, HPI recommended that no additional archaeological investigations are warranted for the proposed wind turbine sites on TRACEN APE.

3.2.6.3 Architectural Resources

The town of Cape May is listed on the NRHP and designated a National Historic Landmark. It contains over 600 wooden Victorian structures dating between 1850 and 1910. The 1994 USACE study concluded that TRACEN contains no buildings or structures that are currently eligible for the NRHP**.** Review of the State Historic Preservation Office database indicates that there are no historical resources designated at TRACEN.

3.2.7 Aesthetics

Aesthetics is referred to as the study of sensory or sensory emotional values, and as a result is subjective by nature. Because the proposed wind turbine project is at a developed USCG installation, existing aesthetics are summarized in the photos of the potential turbine locations provided in the site photo log in Appendix C. In addition to views on-site, considering the potential aesthetic impact of the proposed project, the surrounding viewshed must be considered. The area from which a 420-ft wind turbine can be seen on the site is considered the viewshed of the proposed project.

Cape May is visited by thousands of tourists and other visitors each year to enjoy its Victorian nature and seaside views. The character of the city itself and surrounding region is considered highly aesthetic by those that come to participate in recreational, cultural and other leisure activities. Most of the City of Cape May would remain beyond the viewshed of the project, and the primary views potentially affected by the project are located at Poverty Beach and from the bridge where Route 109 crosses the Cape May Canal.

Photos showing current views of the project area are presented in Appendix C, where they can be compared with anticipated post-project views from the same vantage points.

3.2.8 Fiscal Considerations

Fiscal considerations are important as a basis for evaluating the costs of different project alternatives. The operating budget for TRACEN for Fiscal year 2007-2008 was $25 million. A total of $2 million is budgeted annually for energy expenses, broken down as follows. Thus, approximately 6.7 percent of TRACEN budget goes toward electricity costs.

Table 3-5. Existing Annual Energy Expenditures at TRACEN

Energy Source	Budgeted Amount	Percent of Overall Energy Budget
Gas	$780,000	30
Electric	$1,677,200	65
Other	$124,000	5

3.3 COMMUNITY AND REGIONAL CHARACTERISTICS

3.3.1 Population/Economics

Socioeconomics are defined as the basic attributes and resources associated with the human environment, particularly population and economic activity. Regional birth and death rates and immigration and emigration affect population levels. Economic activity typically encompasses employment, personal income, and industrial or commercial growth. Changes in these two fundamental socioeconomic indicators may be accompanied by changes in other components such as housing availability and the provision of public services. Socioeconomic data at county, state, and national levels permits characterization of baseline conditions in the context of regional, state, and national trends.

On February 11, 1994, President Clinton issued EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. This EO requires that Federal agencies' actions substantially affecting human health or the environment do not exclude persons, deny persons benefits, or subject persons to discrimination because of their race, color, or national origin. The essential purpose of the EO is to ensure the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no groups of people, including racial, ethnic, or socioeconomic groups, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of Federal, State, tribal, and local programs and policies. Consideration of environmental justice concerns includes race, ethnicity, and the poverty status of populations in the vicinity of where a Proposed Action would occur. Such information aids in evaluating whether a Proposed Action would render vulnerable any of the groups targeted for protection in the EO.

Ethnicity and poverty status in the region surrounding TRACEN have been examined and compared to state and national statistics. The Census Bureau bases the poverty status of families and individuals on threshold variables, including income, family size, number of family members under 18 and over 65 years of age, and amount spent on food. In 1990, the U.S. poverty threshold was $11,821 for a family of three and 13.12 percent of the U.S. population was

below the poverty level. Based on the 2000 U.S. Bureau of Census data (see Table 3-6), residents in Cape May County have a higher poverty level than the State of New Jersey poverty level but a lower poverty level than the national level.

Table 3-6. Demographics of Cape May County, NJ

Population, 2006 estimate	97,724
Population, percent change, April 1, 2000 to July 1, 2006	-4.50%
Population, 2000	102,326
Persons under 5 years old, percent, 2006	4.70%
Persons under 18 years old, percent, 2006	20.10%
Persons 65 years old and over, percent, 2006	20.50%
Housing units, 2006	100,568
Homeownership rate, 2000	74.20%
Housing units in multi-unit structures, percent, 2000	36.20%
Median value of owner-occupied housing units, 2000	$137,600
Households, 2000	42,148
Persons per household, 2000	2.36
Median household income, 2004	$44,528
Per capita money income, 1999	$24,172
Persons below poverty, percent, 2004	8.50%

Source: U.S. Census Bureau 2000

These data may be an underestimate, since census data will be updated this year but are not yet available from the U.S. Census Bureau.

3.3.2 Housing

Housing is relative to the proposed project to the degree to which it accounts for facility energy demand. At present TRACEN consists of 172 USCG owned housing units and 91 barracks rooms. Housing facilities are located on TRACEN and just outside the main entrance to TRACEN, along Pennsylvania and Delaware Avenue. TRACEN has a permanent population of 300 and a recruit population of approximately 800-1000 individuals, depending on the time of year. These individuals are housed at TRACEN.

3.3.3 Community Services

TRACEN is almost self-sufficient with respect to community services. Fire suppression and HAZMAT services are provided by the USCG Fire Department, located on TRACEN. Ambulatory service is provided by Cape May County. The Installation is self-policed by USCG military police as well as a private security firm hired by the USCG. Water and electricity usage are described under Section 3.3.6 Utility Services.

Other community services, such as recreation, are provided by TRACEN for USCG personnel. Because access to the installation is limited by security to USCG personnel and official visitors, these facilities are not open to the public.

USCG also provides limited fire truck support to the City of Cape May on an emergency basis. USCG provides educational outreach programs to the local school district on a variety of topics. (USCG also participates in many community charitable causes, and the installation and community are intertwined in many areas, such as the nature center.) Another vital area of concern is the Cape May desalination plant, of which USCG is a primary customer. USCG is the largest payee for the Cape May water system; its fees provide significant support for water related infrastructure in Cape May.

3.3.4 Land Use

Current and historic information pertaining to land uses on TRACEN and in the surrounding communities is necessary to properly manage natural resources and assess future management activities. This section describes land uses associated with the surrounding community, as well as with TRACEN.

3.3.4.1 Surrounding Land Use

The Cape May peninsula has a rich history of alternate land uses. Many of the undeveloped areas in the region are state Wildlife Management Areas (WMA) and uninhabited protected natural areas. In the early 20th century, surrounding areas had been disturbed by diking, dredging, and filling due to development and urban land use. The mid-20th century brought renewal to the area, in the form of tourism. Each year, tourists are attracted to beaches and natural areas of the southern New Jersey coastline (City of Cape May 2002). Tourism in the region remains primarily seasonal, with visitation pressure dropping significantly in the winter off-season.

The proximity of New Jersey's coast to the New York and Philadelphia metropolitan areas has contributed to its growth. The popularity of ecotourism and the number of opportune destinations (WMAs, shallow estuarine areas, extensive marshes, and shorebird viewing areas) over the past decade has contributed substantially to the growth of the tourism industry in New Jersey (NJDEP 2001c).

Marshes and residential areas also cover a large portion of the peninsula. These areas are interspersed with other land uses such as recreational and commercial areas, coniferous and deciduous forests, and open waters. Agricultural areas also cover a large area of the peninsula and are often used for cattle grazing. Beaches are found along the Atlantic Coast and dunes border the beaches on the western side of the peninsula.

The land that is located to the north of Cape May Harbor (to the north and east of TRACEN) is primarily covered with marshlands. TRACEN is bordered on the north and east by Cape May Harbor and on the south by the Atlantic Ocean. Most of the western portion of TRACEN is bordered by the residential areas of the City of Cape May.

The property located across Cape May inlet is undeveloped marsh owned by the U.S. Coast Guard. This area provides habitat for many wildlife species.

3.3.4.2 TRACEN Land Use

TRACEN covers 300 acres, which are predominantly managed to support the mission of the USCG and the Department of Homeland Security (DHS) while protecting ecosystem functionality and structure to the highest degree possible. In order to apply the ecosystem management approach used in this Integrated Natural Resource Management Plan (INRMP), TRACEN has been broken up into several Land Use Management Units (LMUs) to better understand the dynamics between the Installation land uses and the surrounding environment. These LMUs are graphically displayed in Figure 3-5.

Approximately 27 acres of TRACEN is wetlands. Ecological communities designated as "buffer" include: wetlands, coastal sand dunes, coastal beaches, open grassy areas, and improved and semi-improved grounds areas. These areas are managed as part of the Open Space LMU when considering land use because of the relatively low ecological value of these wetlands.

Although TRACEN was established in 1948, most of the buildings and the landscape have been significantly modified. Most of semi- and un-improved land use areas at TRACEN consist of open spaces. However, a large part of TRACEN is improved and is comprised of roads, impervious surfaces, and buildings. The central area of TRACEN consists of approximately 90 buildings that include office buildings, classrooms, barracks, warehouses, maintenance shops, bunkers, dining halls, restaurants, stores, a dispensary, a gymnasium, a fire station, and a daycare center (TRACEN 1997).

There is a large outdoor recreation area in the southwest portion of TRACEN that contains a camping area, running track, soccer field, tennis courts, two ball fields, and an enclosed picnic area. The residential areas on TRACEN are located on the western edge, which is bordered by forested areas. This area is managed as the Outdoor Recreation LMU.

Sensitive species areas within the beaches and dunes lie on the southern boundary of TRACEN where it meets the Atlantic Ocean. There is also a small marsh area on the northeastern edge of TRACEN, along Cape May Harbor.

The USCG limits traffic to TRACEN by use of the main gate at the entrance, accessed via the primary access road. The system of internal roads is maintained within TRACEN to provide access during fire emergencies and TRACEN activities. These paved roads are primarily passable by most vehicles. Figure 2-1 depicts the internal road network within TRACEN relative to the proposed turbine locations evaluated.

Land use at TRACEN is managed by the USCG. Many land modification activities must be permitted through USCG, NJDEP, and NEPA requirements. Specific natural resources management actions of this INRMP often refer back to these LMUs due to the utility of the generalized land uses when considering the Installation from a landscape ecology perspective. These LMUs have been selected based on the manner in which they would be considered during analysis of ecosystem structure of the region. There is limitation in use of this perspective due to the lack of power that USCG has in accessing parts of the greater ecosystem not under their ownership. Therefore, the generalization of the LMU provides a structure by which rough comparisons can be made to the land uses of the surrounding areas.

3.3.4.3 Proximity of TRACEN to Local Natural Areas

Bordered by the Atlantic Ocean on the east, the Delaware Bay on the west, and the Tuckahoe River to the north, the Cape May peninsula is one of the most important natural areas in the world for migratory birds. To protect this important natural heritage, several areas of the Cape May peninsula have been designated as bird refuges, sanctuaries, National Wildlife Refuges, New Jersey State WMAs, and observatories.

In an effort to conserve and protect the areas that are important for the continued success of migratory bird species, a large portion of the habitat in Cape May County is protected by the State of New Jersey WMAs. The WMAs within Cape May County include almost 58,000 acres. The two primary WMAs are Peaslee WMA which is 22,276 acres that extends through Cape May and Cumberland Counties and Tuckahoe WMA which is 14,108 acres of Cape May and Atlantic Counties.

Other natural areas within the area include the Cape May Nature Center and the Cape May Bird Observatory. The Cape May Nature Center, which is located in Cape May Harbor, is managed with assistance by the New Jersey Audubon Society, Clean Ocean Action, and Rutgers Cooperative Extension Service. The Nature Center, located west of TRACEN, offers access to beach and marsh habitat, offers workshops, classes, walking tours, and exhibits to the public. The Cape May Bird Observatory is managed by the New Jersey Audubon Society and is a leader in research, environmental education, bird conservation, and recreational birding activities. Cape May Bird Observatory's mission is to understand and instill appreciation of the needs of resident and migrating birds so that human ambitions do not undermine them.

3.3.5 Hazardous Materials

TRACEN receives, uses, and stores quantities of hazardous materials, including flammable and combustible materials such as vehicle fuels. Additional hazardous materials used at this facility may include corrosives, acids, glycol (anti-freeze), aerosols, paints (latex), cleaning reagents, hydraulic fluids, and lubricants. TRACEN has a hazard communication program to identify the risks associated with the use of these hazardous materials.

Hazardous waste generators are regulated under N.J.A.C. 7:26G-6 et seq. and 40 CFR 262 by incorporation. These regulations require the generator, depending on generator size, to:

- Obtain an United States Environmental Protection Agency (USEPA) generator identification number;
- Determine whether its waste is hazardous;
- Manage wastes appropriately during accumulation;
- Adhere to land disposal restrictions;
- Manifest waste shipments;
- Designate a transporter and a Treatment, Storage, and Disposal Facility (TSDF) that each possess an USEPA identification number;
- Prepare and implement a contingency plan (required for Large Quantity Generators);
- Perform record keeping and reporting requirements; and
- Pay all applicable fees.

Hazardous wastes and materials management are also encompassed under EO 12856, *Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements*. EO 12856 requires Federal facilities to report Toxics Release Inventories (TRI) releases and to set agency goals of reducing TRI reportable releases. Facility Pollution Prevention Plans should include a detailed inventory of waste generation, an analysis of pollution prevention opportunities and options, and a plan for implementing pollution prevention measures. TRACEN utilizes the Pollution Prevention Plan (P2 Plan) for this purpose (TRACEN 1997). Environmental audits are conducted under the Environmental Compliance Evaluation (ECE) Program as required by COMDTINST 16478.5. This program establishes policies, procedures, and responsibilities for compliance with environmental standards.

Fueling for equipment, vessels, or vehicles is conducted as needed at various locations on TRACEN including the piers. TRACEN receives oil products, gasoline, and fuel oil via delivery truck, and stores the product in aboveground storage tanks (ASTs). These fueling operations occur in areas designed to contain any potentially released petroleum products. A current Spill Prevention, Control, and Countermeasure (SPCC) plan for TRACEN includes required actions to prevent release of fuel, such as daily inspections, and use of secondary containment structures. The SPCC Plan also details actions required to respond to a spill of petroleum products (TRACEN undated).

The cleanup and remediation required for potentially contaminated sites are governed by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the New Jersey Cleanup Responsibility Act. A voluntary remediation project at the Fire Training Area was completed. The site's soil and ground water was contaminated with petroleum products used during past fire fighting training exercises. The contaminated soils and groundwater were cleaned up in 2000. A No Further Action letter was received from the NJDEP in 2001.

Hazardous Waste Management

Activities at TRACEN generate limited quantities of hazardous waste. Vehicle maintenance represents the primary activity producing hazardous wastes, mostly in the form of antifreeze, paints, and solvents. New Jersey does not regulate waste motor oils as a hazardous waste. TRACEN is a small quantity generator of hazardous waste, which is defined by the state as generating between over 1,000 kilograms of non-acute hazardous waste per month, or less than 6,000 kilograms at any point in time. Maintenance activities include collection of the waste oils and other materials in appropriate containers. Waste oil, anti-freeze, and waste oil filters are transported off site for appropriate disposal. Daily inspections of drum storage locations are conducted by the Engineer-of-the-Watch (EOW).

Soils on site disturbed during construction will be tested to ensure that they are not contaminated or require special handling. NORESCO has undertaken geotechnical borings and will test the soil in the construction area to ensure that there are no hazardous materials present.

Petroleum Storage Tanks

There are 10 active petroleum products storage tanks in use at TRACEN. All tanks are above ground and contain diesel fuel, No #6 FO, used oil, or unleaded gasoline. All ASTs are visually inspected daily by the EOW. Each AST is provided with a means of secondary containment,

either in the form of double-walled construction or placement in concrete containment structures. Inspections of ASTs are detailed in the SPCC Plan for the Installation. There are no underground storage tanks on TRACEN.

3.3.6 Utility Services

Electrical service is provided to TRACEN by Reliant, Inc. with transmission by Atlantic Electric, Inc. via a network of underground ducts. Access manholes to the electrical ducts are provided periodically along straight runs and at all changes in direction. The main electrical feed to the Installation is through a 4160-volt line running from the eastern boundary. Current electrical usage is approximately 14,356,000kWh per year.

Gas service also is provided by South Jersey Gas, inc. through a pipe main entering at the eastern boundary. Gas lines to TRACEN buildings run alongside Installation streets.

Water and sewer services are provided by the Cape May Municipal Utilities Authority. An 8-inch water main entering TRACEN at Munro Avenue, along the eastern boundary, feeds a water tower located at Munro Avenue. Wastewater from TRACEN flows by gravity through a 10-inch main to a pump station outside the main gate at the corner of Buffalo and Delaware Avenues, from which the wastewater is pumped to the Cape May Wastewater Treatment Plant.

3.3.7 Transportation Services

Public transportation services are not provided to TRACEN as it is a military installation. Currently, the only ways to access TRACEN by roadway is through the guard house located on Pennsylvania Avenue, and a seldom used secondary entrance on Delaware Avenue. The existing transportation network within TRACEN consists of paved roadways used to access various buildings at TRACEN.

3.3.8 Meteorology

3.3.8.1 General Conditions

The climate of the Cape May peninsula is strongly influenced by variable summer and winter temperatures and large daily temperature fluctuations. The daily temperatures for the year range from an average low of 48°F to an average maximum of 61°F. During the winter (normally in the months of January and February), the soils will freeze for short periods of time. The average frost-free period lasts approximately 180 days between mid-April to early November for the area with an average of 10 days each year having at least 1 inch of snow on the ground. However, the number of such days varies from year to year (Dames and Moore 1993, Dames and Moore 1994, USDA-NRCS 2002).

The Cape May peninsula experiences a typically mild maritime climate with an average 47.6 inches of precipitation being distributed throughout the year, with a slightly greater amount being delivered as rainfall between April and September. The average snowfall for the area is approximately 14.2 inches each year. There is only a small water deficit that is incurred during the summer months and a large surplus develops during the spring (Dames and Moore 1993, Dames and Moore 1994).

Approximately 1.27 coastal storms occur per year, which increase tide levels and cover much of the barrier island zone with flood waters. During coastal storms, strong winds may damage unprotected plants and remove organic matter from the already low organic content soils. Thunderstorms occur on an average of 27 days each year (Dames and Moore 1993, Dames and Moore 1994, USDA-NRCS 2002). Climate has affected the formation of the area encompassing Cape May County since the Pleistocene Age (i.e., 1.8 million to 11,000 years ago) (see Section 3.2.3).

3.3.8.2 Suitability for Wind Power

The wind energy industry uses numerical ranks from 1 to 7 to classify areas according to their potential wind resource. According to the *Wind Energy Resource Atlas of the United States* (Elliott et al. 1986), the Cape May area is ranked in wind power class 4, indicative of good wind resource potential.

Mean monthly wind speeds and direction at TRACEN are summarized below in Table 3-7, summarized from National Weather Service information. On a daily basis, wind speeds tend to be higher during daylight hours. Seasonally, they are higher in winter months than during the summer.

Table 3-7. Monthly Wind Data from Cape May

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average Wind Speed (mph) at 328ft above ground	18.5	14.3	17.9	20.4	18.5	15.4	14.1	13	13.6	16.8	17.5	17
Predominant Wind Direction	NWW	NWW	NWW, S	NWW, S	S	S	S	S	S	NWW, S	NWW, S	NWW

3.3.9 Air Quality

Air quality in a given location or region is generally described by the concentrations of various measurable substances known as "criteria pollutants." Concentrations are normally expressed in units of parts per million (ppm), milligrams per cubic meter (mg/m^3), or micrograms per cubic meter ($\mu g/m^3$). Air quality is determined by the type and amount of pollutants in the atmosphere, the size and topography of the air basin, and local and regional meteorological influences. The significance of a pollutant concentration is determined by comparison with Federal and/or state air quality standards. These standards represent the maximum allowable concentrations of various pollutants necessary to protect public health and welfare with a reasonable margin of safety.

Federal standards, as determined by the USEPA, are termed the National Ambient Air Quality Standards (NAAQS). These standards include maximum concentrations for ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter less than 10 microns in diameter (PM_{10}), and lead (Pb) (40 CFR 50). Recent amendments have added a standard for particulate matter less than 2.5 microns in diameter ($PM_{2.5}$) that will be implemented over a period of time. The standards are defined in terms of concentrations determined over various periods of time (averaging periods). Short-term standards (1-hour, 8-hour, or 24-hour)

were established for pollutants with acute health effects, while long-term standards (annual) were established for pollutants with chronic health effects.

The Clean Air Act (CAA) allows states to adopt ambient air quality standards and other regulations, provided they are at least as stringent as Federal standards. NJDEP is the state's air quality regulatory authority. NJDEP has adopted all of the NAAQS, in addition to standards of its own. The additional pollutant regulated under NJDEP standards is Total Suspended Particulates (TSP). Table 3-8 summarizes the Federal and State standards associated with these pollutants.

The CAA and USEPA delegated responsibility for ensuring compliance with NAAQS to the states and local agencies. As such, each state must develop air pollutant control programs and must promulgate regulations and rules that focus on meeting NAAQS and maintaining healthy ambient air quality levels. These programs are detailed in State Implementation Plans (SIPS) that must be developed by each state and approved by the USEPA. A SIP is a compilation of regulations, strategies, schedules, and enforcement actions designed to move the state into compliance with all NAAQS. Any changes to the compliance schedule or plan (i.e., new regulations, emission budgets, controls, etc.) must be incorporated into the SIP and approved by the USEPA.

Table 3-8. National and New Jersey Ambient Air Quality Standards

Pollutant	Standard	Averaging Period	New Jersey[a]	National[b]
Sulfur Dioxide	Primary	12-month arith. mean	80 μg/m^3 (0.03 ppm)	---
	Primary	24-hour average	365 μg/m^3 (0.14 ppm)	0.14 ppm[c]
	Secondary	12-month arith. mean	60 μg/m^3 (0.02 ppm)	0.030 ppm
	Secondary	24-hour average	260 μg/m^3 (0.10 ppm)	---
	Secondary	3-hour average	1300 μg/m^3 (0.5 ppm)	0.5 ppm[c]
Total Suspended Particulates	Primary	12-month geom. mean	75 μg/m^3	---
	Primary	24-hour average	260 μg/m^3	---
	Secondary	12-month geom. mean[d]	60 μg/m^3	---
	Secondary	24-hour average	150 μg/m^3	---
Particulate Matter (PM_{10})	Prim./Sec.	24-hour average	---	150 μg/m^3
	Prim./Sec.		---	
Particulate Matter ($PM_{2.5}$)	Prim./Sec.	Annual arith. mean	---	15 μg/m^3
	Prim./Sec.	24-hour average	---	35 μg/m^3
Carbon Monoxide	Prim./Sec.	8-hour average	10 mg/m^3 (9 ppm)	9 ppm (10 mg/m^3)[e]
	Prim./Sec.	1-hour average	40 mg/m^3 (35 ppm)	35 ppm (40 mg/m^3)[e]
Ozone	Prim./Sec.	Max. daily 1-hr. average	0.12 ppm (235 μg/m^3)	---
	Prim./Sec.	1-hour average	0.08 ppm (160 μg/m^3)	---
	Prim/Sec	8-hour	---	0.075 ppm[f]
	Prim/Sec	8-hour		0.08 ppm[g]
Nitrogen Dioxide	Prim./Sec.	12-month arith. mean	100 μg/m^3 (0.05 ppm)	0.053 ppm (100 μg/m^3)
Lead	Prim./Sec.	3-month average	1.5 μg/m^3	---
	Prim./Sec.	Rolling 3-month average	---	0.15 μg/m^3

Notes: a. New Jersey short-term standards are not to be exceeded more than once in any 12-month period.
b. National short-term standards are not to be exceeded more than once in a calendar year.
c. National standards are block averages rather than moving averages.

d. Intended as a guideline for achieving short-term standard.
e. National secondary standards for carbon monoxide have been dropped.
f. 2008 standard
g. 1997 standard

States or other agencies with non-attainment areas for one or more of the NAAQS may petition USEPA for redesignation as a "maintenance area" if they are able to demonstrate they have met the national standard for the three years preceding redesignation. At the time the state petitions USEPA for redesignation, it must also submit a revision of its SIP to provide for the maintenance of the applicable NAAQS for at least 10 years after redesignation ("maintenance plan") pursuant to CAA §175(A).

The CAA §176(c)(1) prohibits Federal agencies from undertaking projects that do not conform to a USEPA-approved SIP. In 1993, the USEPA developed the General Conformity Rule, which specifies how Federal agencies must determine CAA conformity for sources of non-attainment pollutants in designated non-attainment areas. This rule and all subsequent amendments may be found in the CFR at 40 CFR 51 Subpart W and 40 CFR 93 Subpart B. Through the Conformity Determination process specified in the final rule, any Federal agency must analyze increases in pollutant emissions directly or indirectly attributable to the Proposed Action, and may need to complete a formal evaluation that may include modeling for NAAQS impacts, obtaining a commitment from the state regulatory agency to modify the SIP to account for emissions from the Proposed Action, and/or provision for mitigation for any significant increases in non-attainment pollutants.

The General Conformity Rule and the promulgated regulations found in 40 CFR Part 93, exempt certain Federal actions from conformity determinations (e.g., contaminated site clean-up and natural emergency response activities). Other Federal actions are assumed to be in conformity if total indirect and direct project emissions are below *de minimis* levels established under 40 CFR Part 93.153. The threshold levels (in tons of pollutant per year) depend upon the non-attainment status that the USEPA has assigned to a non-attainment area. Once the net change in nonattainment pollutants is calculated, the agency compares them to the *de minimis* thresholds.

Title V of the CAA Amendments of 1990 requires states to permit major stationary sources. A major stationary source is a facility (i.e., plant, base, or activity) that has the potential to emit more than 100 tons annually of any one criteria air pollutant, 10 tons per year of a hazardous air pollutant, or 25 tons per year of any combination of hazardous air pollutants. The purpose of the permitting rule is to establish regulatory control over large, industrial-type activities and to monitor their impact upon air quality.

Federal Prevention of Significant Deterioration (PSD) regulations also define air pollutant emissions from proposed major stationary sources or modifications to be "significant" if 1) a proposed project is within 10 kilometers of any Class I area; and 2) regulated pollutant emissions would cause an increase in the 24-hour average concentration of any regulated pollutant in the Class I area of 1 $\mu g/m^3$ or more [40 CFR 52.21 (b)(23)(iii)]. PSD regulations also define ambient air increments – limiting the allowable increases to any area's baseline air contaminant concentrations, based on the area's designation as Class I, II or III [40 CFR 52.2 1 (c)].

Attainment Status

Among the provisions of the CAA is the requirement that areas with ozone concentrations above certain levels demonstrate that their plans will meet the health standard within the time frame required by the CAA. New Jersey is required to make such a demonstration for twenty-one counties that have not been designated as in attainment with the NAAQS for ozone. These counties are associated with two multi-state non-attainment areas which are designated the Philadelphia-Wilmington-Trenton Non-attainment Area and the New York- Northern New Jersey-Long Island Non-attainment Area. TRACEN falls within the Philadelphia-Wilmington-Trenton non-attainment area which is classified as moderate non-attainment status.

3.3.10 Noise

Noise is generally defined as unwanted sound, and can be any sound that is undesirable because it interferes with communication, is intense enough to damage hearing, or is considered annoying by members of the public. Responses to noise by living organisms vary depending upon the type and characteristics of the noise, distance between the noise and the receptor, receptor sensitivity and the time of day. Typical noise sources include automobile traffic, air traffic, industrial activities and miscellaneous sources in densely populated areas. Most of the sounds heard in the environment are not composed of a single frequency, but are a band of frequencies, each with a different intensity or level.

The State of New Jersey (N.J.A.C. 7:29) regulates noise impacts to residential areas. The decibel is the accepted standard unit for measuring the amplitude of sound because it accounts for the large variations in amplitude and reflects the way people perceive changes in it. When describing sound and its effect on the human population, A-weighted (dBA) sound levels are used, which are based on the filtering of the noise to deemphasize higher and lower frequencies, similar to the way that the human ear perceives sound. New Jersey statute requires that any continuous airborne sound at the residential boundary between 10:00 pm and 7:00 am be below 50dBA. Sound levels during the day at the residential boundary must be below 65dBA. The 65 dBA standard mirrors that required by the federal government.

The United States Department of Housing and Urban Development (HUD) has adopted environmental standards, criteria and guidelines for determining acceptable noise levels to achieve a suitable living environment. Although the proposed project is not subject to HUD standards, they provide a baseline for comparison with existing conditions and potential project alternatives. Table 3-9 provides a summary of HUD noise acceptability standards.

Table 3-9. Site Noise Acceptability Standards

	Day-night average sound level (in decibels)	Special approvals and requirements
Acceptable	Not exceeding 65 dB(1)	None
Normally Unacceptable	Above 65 dB but not exceeding 75 dB.	Special Approvals (2) Environmental Review (3) Attenuation (4)
Unacceptable	Above 75 dB	Special Approvals (2) Environmental Review (3) Attenuation (5)

Existing noise levels at TRACEN were not measured but likely to fall within these daily guidelines, as there are no major industrial activities present, and TRACEN itself is located in a rural area. Noise sources at TRACEN include automobile traffic, which is usually very light and limited to commuters and occasional visitors. There is no jet traffic, although helicopters regularly land there. During field visits no significant continuous noise sources were noted.

HUD also regulates what are referred to as loud impulsive sounds. An example would be a Department of Defense installation where practice artillery or bombing runs are made. The only such activities that occur at TRACEN are associated with the small arms firing range located along the eastern side of TRACEN well away from the City of Cape May and adjacent to another Coast Guard facility across Cape May Inlet

CHAPTER 4
ENVIRONMENTAL CONSEQUENCES: IMPACTS AND MITIGATION

4.1 SITE CHARACTERISTICS

4.1.1 Topography

Site topography would not change under future conditions, with or without the project. Installation of two 2-MW wind turbines would require construction of two towers, but the actual ground surface elevation or drainage patterns at TRACEN would remain unaffected.

4.1.2 Geology/Seismic Considerations

Under future conditions, the local geology of the area will remain unaffected, as geological processes occur over thousands of years of time. This will be true under Future "No Action" conditions, as well as if the project is built. New Jersey is relatively seismically inactive because of its location on a passive continental margin. With the exception of central and southern Florida, New Jersey's Cape May County has the lowest seismic hazard risks along the eastern U.S. (Peterson, et al., 2008).

Future sea level rise could potentially affect TRACEN, with or without the project. The sea level along the New Jersey coastline has risen at a rate of 0.14 inch/year over the last century. This trend is predicted to continue or worsen in the future (Oppenheimer et. al. 2005). A one foot rise in sea level along the New Jersey coast is predicted to advance the shoreline inward 120 ft (Zhang et al. 2004).

4.1.3 Soils

Existing soils would remain unaffected by the proposed project, and are expected to change little in the future regardless of whether the project is built. Soils in the area are determined by parent material, historical conditions and climate, and the footprint of the two turbine towers would be less than 0.1 acre each. The area is neither farmed nor used for forestry, so existing uses of on-site soils would remain unchanged.

4.1.4 Hydrology

Drainage patterns will remain the same on site in the near future, regardless of whether the project is built. TRACEN is largely flat and stormwater is conveyed by a storm drain system into the harbor. Because the footprint of the wind turbine would be minimal, any potential effects on site drainage patterns would be minimal.

4.1.5 Biological Resources

Under Future "No Action" conditions, no changes to biological resources are anticipated other than natural vegetative succession in portions of the site not subject to mowing or maintenance. Potential impacts to biological resources from the Preferred Alternative are discussed within each individual subsection below.

Wetlands

Wetlands on TRACEN are not expected to change significantly under Future "No Action" conditions. Eventually, over time, areas in the southeastern portion of the site that are scrub/shrub wetland will succeed into forested wetlands.

Regarding potential impacts from the Preferred Alternative, the proposed turbines are located away from any existing wetlands or transition areas so that no wetland impacts would occur during construction or operation of TRACEN.

Birds

Under Future "No Action" conditions, habitat for birds is not anticipated to change significantly at TRACEN. Eventually, the scrub/shrub habitat will undergo succession into forested wetland and uplands over a span of decades if left undisturbed. Developed lawns and parking lots will be maintained in that state.

Because of its location on the Cape May peninsula, a region offering high quality avian habitat within a major migratory corridor, potential impacts to birds from the proposed wind turbine project are of primary concern. Potential impacts to birds from the project were assessed in consultation with Curry and Kerlinger, LLC, experts retained by USCG for analysis of avian impacts.

Curry and Kerlinger, LLC conducted a Phase I Avian Risk Assessment to determine potential collision and displacement risk to birds from project construction and operation at a proposed site. Their risk-assessment process was based on: 1) a site visit, 2) a literature and database search, and 3) written consultations with wildlife agencies regarding special-interest species, as well as other wildlife concerns. Potential avian impacts were evaluated for both breeding and migratory populations of several different species groups of interest such as passerines (perching birds [songbirds]), shorebirds (sandpipers, plovers, woodcock, oystercatchers, and others), raptors (hawks and owls), waterfowl (ducks, geese, coots), and wading birds (herons, egrets and others).

Principal findings of their Phase I avian risk assessment are as follows:

- Because TRACEN is mostly developed, impacts to breeding passerines, raptors and other upland species are not expected to be significant. No habitat impacts are anticipated.
- Because wind turbines would be located in developed locations away from scrub-shrub and forested habitats, impacts to stopover habitat for migratory species are not expected to be significant.
- Typically between about 4-15% of night migrant species fly at heights intercepted by modern wind turbine rotors;
- Some potential exists for impacts to state-endangered least terns flying over the site from Poverty Beach on the southern side of TRACEN to the Cape May Harbor and back; based on data from wind turbines sited at similar locations (e.g., Flanders, Belgium [see Appendix A]) while mortality may occur, this species is not expected to be impacted significantly.

- Because past studies of avian impacts from wind turbines indicate that some avian mortality would occur, and because impacts will potentially involve State listed species (e.g., least tern, osprey, peregrine falcon), depending on post-construction studies, mitigation will be explored for impacted species.
  At the time Curry and Kerlinger, LLC also indicated additional post-construction studies may be required to refine the mitigation approach toward offsetting any avian impacts.

After receiving comments from the U.S. Fish and Wildlife Service, USCG agreed to fund a pre-construction study to further evaluate potential impacts on birds. In 2010 Curry and Kerlinger, LLC reported the following major findings from field work conducted in 2009:

- A total of 274,637 individual birds of 208 species were recorded in 18,932 observations during the study. 74% of birds were landbirds (i.e., mostly songbirds and allies), 25% were waterbirds (i.e., waterfowl, loons, cormorants, herons, shorebirds, gulls, and terns), and 1% were raptors. Overall traffic rates were 435.1 birds/hour for landbirds, 146.7 birds/hour for waterbirds, and 5.0 birds/hour for raptors.
- Landbird abundance had three significant peaks in fall (on August 17, September 7, and October 20). These peaks represented heavy migration that probably coincided with the passage of cold fronts and winds that funneled landbirds into the Cape May Peninsula. Waterbird abundance also showed peaks, particularly after August, but their absolute numbers were smaller. In comparison, raptor numbers were evenly distributed in fall, but an examination of the data shows three peaks: 93 birds recorded on May 18, 94 on October 8, and 122 on November 20. Large waves of migrants were not recorded in spring migration (i.e., before June 1).
- Among waterbirds, 15 species were recorded in excess of 468 birds (1 bird/hour) and made up 94% of waterbirds recorded. Four of these species were gulls – Laughing, Herring, Greater Black-backed, and Ring-billed – but they made up more than one-half of all individual waterbirds. Four terns were represented among the most abundant waterbirds: Forster's and Royal terns, but also the New Jersey-endangered Least Tern (also *Red WatchList)* and special-concern Common Tern. Double-crested Cormorant was the third most abundant waterbird. Two other special-concern species were also among the most abundant birds: Glossy Ibis and Sanderling (also *Yellow WatchList).*
- Fifteen of the 16 raptor species normally recorded at hawk watches in northeastern North America were recorded. Turkey Vulture and Osprey (NJ threatened during the breeding season) were by far most abundant, and the only raptors recorded in excess of 468 individuals (1 bird/hour). The New Jersey-threatened Cooper's Hawk was relatively abundant, as was the endangered Peregrine Falcon. Both these species used the site regularly. Cooper's Hawk was suspected to nest in a pine grove in the southeast corner of the site, and Peregrine Falcon regularly roosted on the water tower in the northeast corner of the site.
- Tree Swallow was by far the most abundant landbird recorded, accounting for nearly 70% of all landbirds recorded, and 50% of all birds recorded. Another 17 species were recorded in numbers exceeding or equal to 468 individuals (1 bird/hour). Together, these 18 species made up 98% of all landbirds recorded. Of them, the second most abundant landbird, Yellow-rumped Warbler, is a nocturnal migrant.

- Examination of the flight height of birds over land demonstrated that waterbirds were found to fly over land at a rate of 57.56 birds/hour, of which 23.9% (13.76 birds/hour) were recorded flying at altitudes equivalent to the RSZ. Raptor passage over land was recorded at 3.70 birds/hour, of which 41.9% (1.55 birds/hour) were recorded at altitudes equivalent to the RSZ. Landbird passage was recorded at 421.46 birds/hour over land, of which 34.2% (144.35 birds/hour) were recorded at altitudes equivalent to the RSZ.
- No federally endangered or threatened species was recorded. Of the New Jersey list, four endangered, eight threatened, and 22 special-concern species were recorded
- Additionally, 13 unlisted *WatchList* species were recorded. Two of the endangered species were breeding within a few miles of the Project: Least Tern (also *Red WatchList)* and Black Skimmer. Least Tern is particularly noteworthy because a breeding colony was located on the oceanside beach adjacent to the USCG base. As a result, it was the most abundant special-status species recorded. Four threatened species were local breeders: the two night-herons (likely), Osprey, and Cooper's Hawk. According to observer Jim Dowdell, a pair of Cooper's Hawks may be nesting in a pine grove on the USCG base. Eight special-concern species appeared to be local breeders, of which Common Tern was most abundant, followed by Glossy Ibis. One unlisted *Yellow WatchList* species was a local breeder: Willow Flycatcher, which nested on the base.

Turbine Site Selection Based on Potential Avian Risks

In an effort to minimize the potential impact to birds at the Project site, a turbine site selection process was conducted. After identifying five locations where turbines could, potentially be located on TRACEN, two avian experts (Paul Kerlinger and James Dowdell), as well as Chris Hadjuk, an expert on avian movements at TRACEN, rated each potential turbine site on a rank order scale of one to five, with one being the least likely to cause impact and five potentially posing the greatest impact. The sites were rated based on two criteria: habitat at and surrounding the potential turbine site, and each expert's knowledge of bird behavior. The former was based on actual site visits, whereas the latter was based on behavior observed by birds both at the Project site and at other locations. The flight and foraging behaviors of shorebirds (including Piping Plover) and terns (including Least Tern) were of primary concern, with other species (Black Skimmer, night-herons, hawks, etc.) also being considered. The two sites selected for turbines were rated as "1" or "2" and were further removed from habitat that would be used by most species of birds. The other three sites were rated as "4" or "5", with respect to risk, and they were closer to areas where bird use was believed to be much greater. Flight of shorebirds, terns, songbird migrants, and other species was considered and the sites selected were considered to be farther from heavily used flight corridors on TRACEN. Results of these qualitative rankings are summarized in Table 2-4 and were used in conjunction with other factors to determine the most suitable locations for the two turbines.

Potential Impacts to Breeding Birds

Few birds are likely to breed at the proposed turbine sites on TRACEN because these areas are mostly developed with buildings and lawns. Except possibly for Killdeer, no birds are likely to nest on the mowed lawns surrounding the proposed turbine placements. Construction of the

Curry & Kerlinger, LLC — January 2010 ©

turbine towers would not displace a significant amount of habitat, and is not likely to significantly affect breeding birds. Mortality to some individuals nesting in the general area and flying over the site is expected, but is not anticipated to impact populations or to be biologically significant.

The primary potential for impacts to birds during the breeding season rests with the anticipated mortality from birds colliding with blades during transit flights over the site. This may include species of birds classified as threatened and endangered species in New Jersey. Some of these birds may be likely to fly over the site frequently, given its location on an access-restricted, barrier-beach peninsula bordering an inlet between the Atlantic Ocean and a large, productive coastal bay. The list of possible species includes four that are endangered in New Jersey. Peregrine Falcons, both introduced South Jersey nesters and migrating tundra individuals are present at the site at different times of the year, although there are no known breeding records on site. Piping plover (also federally threatened and *Red WatchList*) nests on the Atlantic-side beach habitat adjacent to the site at Poverty Beach, where courtship and other flights could conceivably take it over the site. None were observed during the 2009, on site study. A colony of least terns (*Red WatchList*) nests regularly on the Atlantic-side beach adjacent to the site. Birds from that colony have been observed crossing the site many times daily on foraging flights to Cape May Harbor. Black Skimmer (*Yellow WatchList*) does not breed on site, but birds roost on beaches adjacent to proposed turbine areas.

Curry and Kerlinger, LLC, in their study at TRACEN as reported in 2010 found that the state-endangered Least Tern was the most abundant special-status species flying at altitudes equivalent to the RSZ (calculated at 1.1 birds/hour). This is because it had the greatest overall abundance of any special-status species (overall abundance of 4.1 birds/hour), was recorded at the greatest percentage over land of any special-status waterbird (82%), and flew at M height (30-120 m) at a relatively high percentage (34%). Least Tern also had the greatest peak abundance (41.5 birds/hour on July 15); in fact, the number of birds recorded remained high for a two-week period in mid-late July, when adults were feeding nestlings, possibly attracted by an influx of small baitfish in Cape May Harbor, but some fledglings joined adults in crossing the base.

The state-threatened Osprey does not presently nest at the site, although a number of pairs breed in the area and their foraging flights take them regularly over the site. Curry and Kerlinger, LLC observed flight lines and elevations of osprey within the vicinity of TRACEN. In their 2010 study the abundance of the threatened Osprey at altitudes equivalent to the rotor-swept zone (RSZ) was 0.32 birds/hour, which is 72% below that of Least Tern. This lower value owes primarily to a lower overall abundance and a lower percentage of birds flying over land. Nonetheless, the Osprey's abundance pattern by date was different than that of Least Tern, with peak values of about 5 birds/hour were consistently recorded from spring through early fall.

Other threatened species recorded in the Cape May area that likely transit the site during the breeding season include Black-crowned Night Heron, Yellow-crowned Night-Heron, and Red Knot (also *Yellow WatchList*). A number of special-concern species could also conceivably transit the site, including Snowy Egret, Little Blue Heron, Tricolored Heron, American Oystercatcher, Gull-billed Tern, and Common Tern.

Mortality to these species may potentially be mitigated by curtailing operation of the turbines during summer breeding periods. One study from Belgium (Appendix A) found least terns did not fly at heights intersecting the blades, andtheAvian Abundance and Use Survey indicated few risks to terns if turbines were constructed at the Perchard Ave 1 and Buoy Yard 1 sites.

Remaining impacts may include incidental mortality to resident species on site, which, based on prior results at other wind turbine sites would not be expected to significantly impact their populations. There is some scrub-shrub habitat in the southeastern portion of the site that provides habitat for common breeding passerines. Adjacent coastal scrub habitat fringing the site may be appropriate nesting habitat for some special-status passerines, such as the New Jersey special-concern Yellow-breasted Chat and Brown Thrasher and *Yellow WatchList*[2] Willow Flycatcher and Prairie Warbler.

Potential Impacts to Migratory and Wintering Birds

Potential impacts to migratory and wintering birds would be expected based on the scrub-shrub habitat provided by the site and surrounding area, as well as the Poverty Beach shoreline, which provides habitat for shorebirds and other waterbirds. The habitat itself would remain unaffected, but some direct mortality from birds hitting the tower or blades is anticipated. To avoid and minimize potential impacts, the wind turbines are proposed to be located as far as possible from these habitats, and limited in number to two turbines. Resultant mortality to migratory and wintering birds is not anticipated to be biologically significant, but additional post-construction studies will be performedto further evaluate the need for mitigation, such as shutting down the turbines during key migratory periods.

Large numbers of migrating songbirds, raptors, and waterbirds occur in the vicinity of TRACEN, particularly during fall migration, given the site's location on the Atlantic Ocean near the tip of the Cape May peninsula. The nocturnal migration of songbirds over Cape May has been documented as highly concentrated by both direct visual and radar studies. Coastal "fallout" events regularly occur, as birds aloft in sight of land redirect themselves to the nearest habitats to rest and feed and birds flying overland seek havens in habitats on-site and nearby. These fallout events are most impressive in fall on heavy flight nights following cold fronts, when birds are battling headwinds to return to shore. Under those conditions, large numbers of birds often use the coastal shrub thickets located at TRACEN and in the surrounding area. This use has been documented at nearby Sewell Point (off Pittsburgh Avenue), where passerine numbers were found to be as large as those documented elsewhere south of the Cape May Canal, including Higbee Beach. Early morning dispersal flights (also known as morning flights) are also expected to occur at TRACEN, as songbirds move at relatively low altitudes along the barrier islands or inland to settle into suitable habitats for resting and feeding. Fallouts also occur in spring, but the numbers of migrants involved are usually not as great as in fall and their dynamics differ. Daytime-migrant songbirds may also be expected to migrate along the barrier beaches, sometimes in very large numbers.

Although fatality numbers and species impacted at TRACEN are likely to be greater (on a per turbine and per megawatt per year basis) than those found at Eastern and Midwestern U.S.

[2] The recently published *2007 WatchList for United States Birds* highlights all the highest priority birds for conservation in the United States. See Section 4.1 discussion.

projects that have been studied, they are still expected to occur at levels that are unlikely to significantly impact avian populations. Most importantly, because only two turbines are proposed, the anticipated avian mortality will not be significant enough to affect local populations, and therefore overall species impacts will not be biologically significant.

Potential Avian Risks

Despite the nature of the Cape May peninsula as a major migratory corridor and mosaic of habitats for a large diversity of species, no biologically significant impacts have been identified for the proposed project. This conclusion, as reported in the Draft EA is based on the following:

- Because the proposed locations have been placed in developed locations, important avian habitat would not be modified or disturbed as a result of construction of the turbines.
- Because the proposed sites have been specifically located to avoid or minimize impacts to birds, mortality from operation of the turbines should be minimized.
- Should mortality occur, prior studies at other facilities indicate that it would not likely occur at levels that would impact avian populations.
- Mitigation will be undertaken to offset any unacceptable mortality that may be found through post-construction studies.
- Construction impacts would be short-term and have no measurable effect on bird populations. Construction would take place at least ~1,000 ft away from nests of one or two New Jersey endangered species – Least Tern (apparently a regular breeder adjacent to TRACEN) and Piping Plover (possible breeder adjacent to the site). The plover is also federally threatened, and both are *Red WatchList* species.

The findings of the pre-construction avian abundance and use survey conducted by Curry and Kerlinger, LLC did not find any data or evidence that would cause this conclusion to be re-evaluated or negated. These authors reported that while mortality to birds using TRACEN would undoubtedly occur due to impacts with the turbines, the mortality is unlikely to be biologically significant based on the amount of mortality seen at similar sites and the fact that only two turbines are proposed for construction.

Wind-turbine operation could have two displacement effects. It could displace nearby breeding birds, and it could affect foraging or other flight in the site's airspace. In both regards, the species of greatest concern would be the State endangered least tern and piping plover, as well as several other species (Osprey, Peregrine, etc.). Nonetheless, research from a Belgium site, where artificial tern-nesting habitat and a wind farm were constructed side by side, indicates that wind turbines do not displace nesting terns, plovers, or their foraging-flight paths.

Post-construction fatality studies have demonstrated that fatalities are relatively infrequent events at wind farms. In a recent review of the literature on U.S. wind farms, mortality estimates were similar among projects, averaging 2.51 birds per turbine per year and 3.19 birds per MW per year. Since that review, rates at some eastern U.S. sites have demonstrated slightly greater fatality rates (up to about 7 birds per turbine per year) than in the west, presumably because of denser nocturnal migration of songbirds in eastern North America. No federally listed endangered or threatened species have been killed, and only occasional raptor, waterfowl, or shorebird fatalities have been documented. In general, the documented level of fatalities has not been large in comparison with the source populations of these species, nor have the fatalities

been suggestive of biologically significant impacts to these species. It is important to note that the available data in the literature are based on wind farms consisting of 10 or more turbines. The Preferred Alternative at TRACEN would involve construction of two turbines, so impacts would not be anticipated to be nearly as great, due to the smaller area that would be covered.

For example, data reported by New Jersey Audubon Society (NJAS) based on post-construction monitoring studies at the Atlantic City Municipal Utilities Authority (ACUA) from 2007 through 2009 indicate that the number of bird carcasses encountered per turbine ranged from 2 to 14 carcasses recovered (see Table 3 in NJAS summary in Appendix A). The ACUA project consists of five 1.65-MW wind turbines, each with a 262-ft tower (with 120-ft long blades) clustered in the same location near the Atlantic shoreline. The total height of each turbine from the ground to the tip of each turbine is 388 ft.

If one accepts the "adjusted" estimate of mortality derived by NJAS based on the area accessible for searching, then the maximum mortality noted to date per any turbine at that facility is 32 birds. Considering this result is spread over a two-year period and amongst several different species, the biological impacts from a single turbine or even two turbines would not be biologically significant.

Avoidance

To avoid and reduce impacts to birds and bats, USCG has reduced the number of towers initially considered from three to two towers. The result will enable USCG to meet 75% of the KWh of energy necessary, enabling TRACEN to meet objectives of self-producing energy while avoiding additional mortality to birds. To further avoid impacts, the proposed turbines are to be located within the developed portion of the installation. This would help avoid impacts to birds by ensuring that the turbines are located in open developed areas used less by birds during breeding and bird and bat migratory periods.

Minimization

Data suggest that bat migratory behavior is highly variable and periodic but may be higher on warmer nights with lower wind speeds (Reynolds 2006, Arnett et al 2008). Bat impacts could likely be minimized by feathering the turbine blades so that they become stationary at low wind speeds (<6 m/s) during the key months of August through September. This could help reduce the number of avian fatalities as well during the fall migration. Post-construction monitoring (e.g., counting numbers of dead birds and bats) would be undertaken concurrently to ensure that significant fatalities are not occurring during migratory periods.

Mitigation

The amount of avian mortality anticipated from the proposed project is not anticipated to be biologically significant. TRACEN will conduct post-construction morality studies to determine turbine impacts. Should post-construction study results indicate turbines have a greater than expected impact, mitigation measures can be applied to lessen impacts. Potential mitigation options to offset avian mortality include:

- Reduction in turbine operation (e.g., use of feathered blades) during critical migratory periods, as needed based on wind speed and direction.
- Creation of least tern nesting areas and osprey nesting platforms on other government owned property.

Potential Impacts to Bats

Potential impacts to migrating bat populations represent a primary environmental concern associated with the proposed project. Recent post-construction mortality surveys at wind turbine sites have revealed a relatively consistent pattern of bat mortality. Surveys from across North America suggest that migratory tree bats are being killed at higher rates than other species (Kunz et al 2007a). For example, a summary of mortality data from nine wind facilities in the United States showed 86% of the identified mortality came from three species (hoary bats, red bats, and silver-haired bats: Erickson et al. 2002). Projects in the eastern United States also see a relatively large number of eastern pipistrelle mortalities. The reason for these species being at higher risk of collision mortality is uncertain. The hoary bat and silver-haired bat are found across North America and are therefore potentially found at any wind development site in this region. The other two species (eastern red bat and eastern pipistrelle bat) are more regional in distribution than these pan-continental species, but still have geographic ranges that extend over thousands of miles. It is likely that these large geographic ranges and the long-distance migratory behavior of these species (except pipistrelles) expose them to a higher risk of turbine-related collision mortality.

Data on the pattern and timing of migratory behavior in bats is relatively anecdotal. For example, Carter (1950) reported two red bats collected in late September from a flock of an estimated 200 bats that circled a ship 65 miles off the New England coast. During early September, Thomas (1921) reported silver-haired bats and red bats being collected from a group of approximately 100 bats that landed on a ship 20 miles off the North Carolina coast. Survey efforts have documented both spring and autumn migratory "waves" of tree bats moving across a landscape; these data show multiple individuals being captured (Barclay et al. 1988, Findley and Jones 1964, Mumford 1963, Mumford 1973, Vaughan 1953) or acoustically detected (Reynolds 2006) within a relatively short time period. Evidence suggests that tree bats feed during autumn migration. Miller (1897) observed both silver-haired bats and red bats foraging during a migration stopover on the Atlantic Coast and a female hoary bat collected while migrating through Florida was feeding during late October (Zinn and Baker 1979). Evidence indicates that tree bats may sometimes migrate with, or under similar conditions as, birds and therefore be susceptible to similar mortality factors. This includes collisions with human-made structures such as light houses (Saunders 1930), television towers (van Gelder 1956, Crawford and Baker 1981); and buildings (Terres 1956, Timm 1989).

Data from wind projects throughout the United States have shown that bats and birds collide with wind turbines. A summary of bat mortalities at nineteen wind projects in 15 states and several international sites show estimated annual mortality rates between 0.1 – 63.9 bats per turbine (Barclay et al 2007). Concern has been raised over the level of bat mortality experienced at several sites in the eastern United States, and existing data suggest eastern wind development sites experience higher rates of bat mortality than western sites (Johnson 2005). These post-construction mortality surveys have shown that the migratory bats are more susceptible to wind turbines than other bats (Gruver 2002, Johnson et al. 2003). Temporal analysis of these data

shows that most of this mortality occurs in the month of August when these bats would be beginning their fall migration. Therefore, the distribution and timing of mortality seems to be biased toward non-hibernating migratory bats.

A site survey was conducted by North East Ecological Services (NEES) on January 16, 2009 to determine the presence of potential roost sites for Indiana myotis and eastern small-footed myotis. After walking the project site, no hardwood or softwood snags that might serve as potential summer roosting habitat for the Indiana myotis were observed within any of the wooded areas of TRACEN. In addition, no rock outcrop or talus habitat (save the jetty located at the southeast corner of TRACEN) that might serve as potential habitat for the eastern small-footed myotis was observed on TRACEN grounds. Finally, to our knowledge there are no records of Indiana bats in the southern coastal zone of New Jersey, so the species does not seem to be present at or near TRACEN. It is the opinion of NEES that no suitable summer roosting habitat for either species of conservation concern (Indiana myotis and eastern small-footed myotis) occurs on TRACEN grounds. This conclusion would not change as a result of the turbines being moved to different locations.

The available trees may offer summer roosting opportunities for both eastern red bats and hoary bats (solitary roosting species that are known to roost in both deciduous and coniferous trees). It is unlikely that silver-haired bats would roost at TRACEN grounds during summer due to their limited summer distribution at the latitude of TRACEN, and the tendency of silver-haired bats to roost in tree hollows and crevices which were not commonly observed during the site visit. Eastern pipistrelle and northern myotis are likely regional summer residents within Monmouth County. However the species composition and decomposition stage of hardwood trees on TRACEN grounds is atypical and generally not preferred by these species. Lastly, the little brown myotis and big brown bat roost within human structures during summer months (at least in the eastern United States). These species typically roost within older human structures with access to warm areas (for example, barns, church attics, etc.). The building present on TRACEN grounds were of relative recent concrete construction and did not appear to offer suitable roosting habitat for these species. Additionally, TRACEN biologist Chris Hajduk reported no known colonies of either species on the project site.

In terms of foraging/drinking habitat, no open freshwater bodies (either streams or ponds) were observed during the site visit, although freshwater marsh habitat was available. The freshwater marsh habitat was mainly covered by wetland plant species (e.g. *Phragmites* spp.) and therefore would not present an opportunity for bats to gain drinking water. It is the opinion of NEES that the lack of available freshwater, in addition to the lack of suitable trees species for summer roosting by most species of bats that could potential reside on TRACEN grounds, makes it unlikely that the project area contains significant summer populations of bats (including both species of conservation concern) that might be negatively affected by the proposed wind turbine development. In summary, some of the principal findings are:

- Bat species most commonly killed are migratory tree-roosting species such as Eastern red bat, hoary bat and silver-haired bats (Cryan and Brown 2007, Kunz et al 2007a, b, Arnett et al 2008);
- The number of annual bat fatalities between wind energy facilities is highly variable, ranging from 0.3 to 63.9 bats per turbine (Barclay et al 2007);

- Fatality rates are highest in the eastern U.S. along forested ridgetops, and are lowest in relatively open landscapes (Kunz et al 2007);
- Late summer and early fall represent the greatest periods of risk (Cryan and Brown 2007, Kunz et al 2007a, b, Arnett et al 2008);
- To date there have been no documented fatalities of State or Federally-listed endangered bat species (Kunz et al 2007).

The number of projected bat fatalities from the proposed project is unknown, but some indication can be gathered from prior studies at wind energy facilities. Even if the maximum number of fatalities from the published literature were used (63.9 bats per turbine per year from Buffalo Mountain, TN: Fiedler et al. 2007) as a projected mortality figure, the total number of bats killed from the two proposed turbines (128/year) would not likely significantly influence the overall population of the principal species likely to be affected (red and hoary bats).. Since fatalities are highest in the eastern U.S. (Kunz et al 2007), our analysis focuses on the seven studies from eastern wind projects described in Barclay et al 2007. The mean number of annual fatalities per turbine from all seven studies is 37.2 fatalities per year.

Based in conservative assumptions, the resultant anticipated fatality numbers would therefore be on the order of 74 bats per year (based on average numbers for all eastern sites) to 128 bats per year (based on worst case maximum numbers).

A more realistic scenario is provided by a wind project constructed by the ACUA in Atlantic City, New Jersey is probably the most comparable site to TRACEN project because it is coastal and the turbines are in open areas that are unlikely to be used by foraging or roosting bats. Post-construction mortality studies (based on carcasses retrieved) at that facility from July 2007 through June 2008 totaled 31 bats, mostly during fall months (August and September 2007 – see Appendix D). More recent data collected in 2009 indicated 5 bat carcasses were found over the course of the year, consisting of red and hoary bats. Again the majority of the mortality was between August and September. Because mortality estimates here are reported on the basis of carcasses retrieved, actual mortality may have been higher due to the following: not all of the areas beneath turbines were accessible to searching; searchers are not 100% efficient, so some carcasses are not found; and some carcasses may have been lost to scavengers prior to counting.

While environmental conditions at that facility cannot be considered identical to those at TRACEN due to the latter's location at the tip of the Cape May peninsula and the fact that the facility has five turbines, not two, the data from the Atlantic City site likely provide a conservative indication (overestimate) of what the expected fatalities to bats would be from two towers constructed at TRACEN.

Based on the available information to date on wind turbine and bat interactions, the following elements of the project have focused on avoidance, minimization and mitigation for potential bat impacts. It should be noted that the avoidance, minimization and mitigation approach to impacts has been coordinated with the approach for reducing potential impacts to birds.

Avoidance

To avoid and reduce impacts to birds and bats, USCG has determined that two turbines located within the developed portion of the installation would help avoid impacts to bats by ensuring that the turbines are located in open country less favored for foraging and roosting.

Minimization

All of the post-construction data collected to date suggest that August and September are the periods of peak bat migratory activity, and consequently peak bat mortality. Radar data from the Bascule Draw Bridge located across the Middle Thorofare from TRACEN found peak nocturnal migrant activity was from August to September; although this study could not discern bats from birds, it is likely that any bats migrating near the project site would have been detected during this study. Recent data collected by Barclay et al. (2007) has suggested several design and operational conditions that may be causing an increase in bat fatalities at modern wind turbine facilities. Specifically, he found that bat fatalities increased exponentially with tower height, but not with the diameter of the turbine rotor; specifically, Barclay et al. (2007) concluded that turbine towers greater than 65 meters (213 ft) exhibited the highest fatality rates. Other studies have shown that the highest number of bat fatalities occur on nights when wind speeds are low (<6 m/s, or about 13.5 miles per hour: Kunz et al 2007, Arnett et al 2008), and also immediately preceding or following storm fronts (Cryan 2007, Arnett et al 2008) that may provide ideal conditions for migratory bats. Lastly, Cryan (2008) hypothesized that bats are attracted to turbines as surrogate trees, possibly as part of their mating behavior.

Given this knowledge, bat impacts could likely be minimized by feathering the turbine blades so that they become stationary at low wind speeds (<13.5 miles per hour) during the key months of August through September. Turbine feathering during low wind speed at a Canadian wind turbine facility (using similar turbine design and involving the same bat species) during the month of August resulted in a 52% reduction in bat mortality (Edworthy et al., 2008). It is reasonable to presume that feathering turbines at TRACEN during this peak migratory period would reduce bat fatalities by a similar magnitude. Assuming this is the case, the projected annual fatalities (based on the highest number of carcasses reported in the ACUA data) would be 31 bats, which reduced by 52 percent would result in approximately 16 bat fatalities per year, spread amongst at least two species.

It is critical to confirm the impact of this minimization strategy by using well-designed before-after-control impact (BACI) studies that test responses of bats to different operating conditions (Kunz et al 2007). This would include a post-construction mortality survey (e.g., counting numbers of any dead bats) to ensure that significant bat fatalities are not occurring during migratory periods. This is probably not necessary during spring months, since few fatalities have been noted in prior studies (Kunz et al 2007).

Mitigation

The proposed mitigation for significant bat fatalities is to reduce power generation during the peak migratory period (August and September) when wind speeds fall less than 13.5 miles per hour. USCG could also fund a post-construction research program aimed at correlating the number of bat fatalities to site conditions, meteorological conditions, and operating conditions.

Post-construction monitoring could also evaluate the frequency of barotrauma (internal hemorrhaging in the lungs resulting from rapid pressure drops in the turbine wake vortices) in bats; it has recently been suggested that barotrauma is a significant source of injury and mortality for bats at wind turbine facilities (Baerwald et al. 2008). USCG is willing to coordinate a Technical Advisory Committee (TAC) of independent professionals to ensure that monitoring is objective, scientifically valid and peer-reviewed. The results of the monitoring in conjunction with different operating measures will help answer questions regarding how wind turbines can be operated to safely avoid wildlife impacts.

Potential Impacts to Other Wildlife

Given that the two proposed turbines would be constructed within a developed portion of TRACEN, and no habitat would be disturbed, no impacts to other species of wildlife or their habitats are anticipated.

4.1.6 Cultural Resources

Under the Future "No Action" alternative, no impacts to aesthetics will occur. Views from different vantage points (cited below) within Cape May will remain the same as under existing conditions. Because there are no known historical or archaeological resources at TRACEN, and the probability of such resources is unlikely, no significant impacts on these resources are anticipated from construction of the proposed project. Once constructed, the turbines should not significantly impact views from the historic Victorian part of the city, since they are located approximately one mile away and views will be largely blocked by buildings and trees.

4.1.7 Aesthetics

Potential project impacts on aesthetics were considered by evaluating three major vantage points from which the two proposed wind turbines would be visible to the public. Locations from which the photos were taken are shown on Figure 4-1. These are:

- Homes located on Buffalo Avenue near the entrance to TRACEN;
- Poverty Beach; and
- The Route 9 Bridge upon entering the City of Cape May.

Actual and projected future views of the proposed wind turbine are shown in Figures 4-2A through 4-4B. Photos of existing conditions from these vantage points are provided, immediately followed by photomontage work indicating what the skyline would look like from each location, should the turbines be built. The photomontages were produced using software specific to locating wind turbine on the horizon based on proposed dimensions and distance from existing structures. Global positioning system (GPS) coordinates were taken at each proposed location to ensure the accuracy of the proposed view relative to distance from vantage points and perceived view based on the height and diameter of the towers and blades.

As can be seen in the photos, moving the turbine locations from prior locations D and Alt-E to Perchard Ave 1 and Buoy Yard 1 locations will actually reduce the visibility of the turbines from locations on Poverty Beach and nearby residences. Review of the photos indicates that the turbines are barely visible from these locations.

As to the view from the Route 9 location, the height of the blade from each turbine would extend to a similar height as that of the Rescue 21 tower located in the southern portion of the Installation. Because the blades and tower would be painted white, they should blend in more with the surrounding area than if they were a darker color.

Regarding potential on-site aesthetic impacts, the two proposed turbine locations have been selected to avoid potential "flickering" impacts to occupied buildings (as a result of the blades blocking or reflecting the sun) as best as possible.

4.1.8 Fiscal Considerations

Implementation of the preferred alternative would allow the USCG to consider retrofitting existing equipment that runs on fossil fuels to electrical equipment at a lower cost, with fewer environmental impacts. The preferred alternative would also be substantially less expensive than purchasing renewable energy from off-site sources, as the wind turbines have a simple payback of approximately 11 years.

4.2 COMMUNITY AND REGIONAL CHARACTERISTICS

4.2.1 Population/Economics

Under the Future "No Action" alternative, the population and economics of Cape May will continue according to current trends. There has actually been a downward trend in resident population in recent years. Part of the city's economy will continue to benefit from the existence of TRACEN.

The population data provided in Section 3 are based on the U.S. Census Bureau year 2000 census. An updated census is planned for the year 2010. While the population of Cape May County has actually declined over the past six years, it is anticipated that population trends would remain unaffected by the project. Proposed construction of a wind project at TRACEN should have no effect on the local population or local economics. Should TRACEN ultimately become self sufficient with respect to energy needs, it is unlikely that the energy production at the Installation would affect market rates for electricity in Cape May or elsewhere.

Construction of a renewable energy project by the USCG should encourage the use of other renewable energy projects to help reduce demand on fossil fuels within the Cape May area.

4.2.2 Housing

Housing needs at TRACEN are expected to remain constant over the next 10 years regardless of whether the project is built. Housing at the Installation is for military personnel and their families and would remain unaffected by the proposed project.

4.2.3 Community Services

TRACEN is self-sufficient with respect to fire and police protection services. Water and sewer use will remain similar in the future to present conditions, regardless of whether the project is built.

4.2.4 Land Use

Land use within the immediate vicinity of TRACEN is not expected to change significantly in the future under "No Action" conditions. The federally-owned TRACEN is surrounded by water on three sides, and the south western side consists of the nature center that consists mostly of freshwater wetlands and cannot be developed. Land use would remain unaffected by construction of the proposed wind turbine project.

4.2.5 Hazardous Materials

Hazardous materials use and handling under the "No Action" alternative will remain the same as under present conditions. No hazardous materials would be generated by the wind turbine project, either during operation or initial construction. Hazardous materials at TRACEN will continued to be handled in accordance with federal regulations.

4.2.6 Utility Services

Utility services will remain similar in the future, with or without implementation of the project. USCG would purchase less electricity from outside providers, but infrastructure electricity in place would remain the same. Some minor re-routing of electric utilities might be required at the Perchard Avenue location, but in areas already developed.

4.2.7 Transportation Services

The existing transportation network at TRACEN will remain the same in the future, under "No Action" conditions. While roadway configurations may continue to change in the future due to changing needs at the Installation, these would remain largely unaffected by the location of the turbine.

4.2.8 Meteorology

Under Future "No Action" condition, global warming is expected to continue. However, local weather patterns are a function of atmospheric processes occurring at a far greater scale than at TRACEN. Therefore meteorology of the site would remain unaffected by the proposed project.

4.2.9 Air Quality

Air quality is anticipated to remain similar to present conditions under the "No Action" alternative. The wind turbine would generate electricity from wind power and does not consume any fossil fuels or produce any particulates. Therefore air quality in the vicinity would remain unaffected by the proposed project, and none of the *de minimus* thresholds are anticipated to be exceeded.

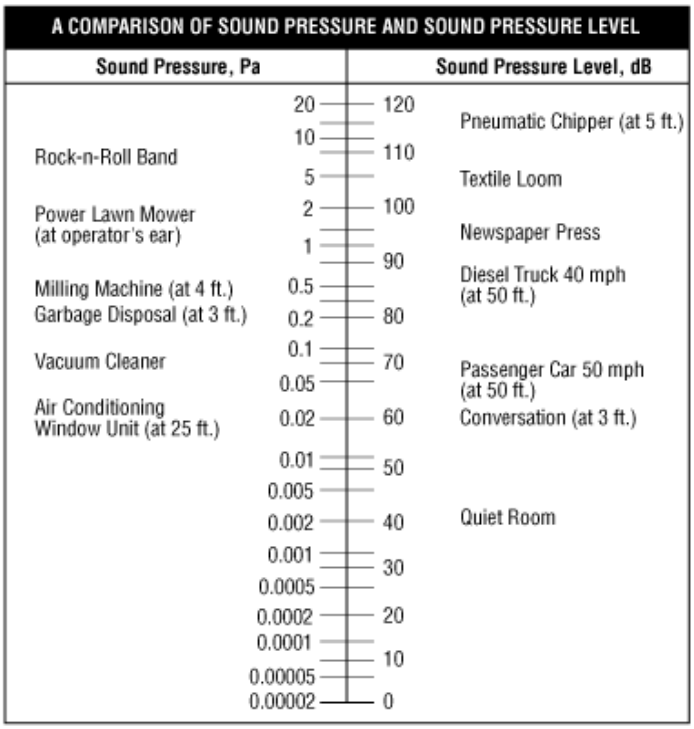
There is a possibility of fugitive dusts being created during the construction phase, as a consequence of clearing the limited footprint areas (1,250 square ft) of each tower. However, this is considered a short-term impact limited to small portions of TRACEN and is not anticipated to be significant. Dust control measures will be implemented during construction, as will standard soil erosion and sediment control practices.

4.2.10 Noise

Noise levels at TRACEN are influenced by ongoing motorized boat traffic in the harbor, occasional helicopter landings, and small arms fire at the firing range on the eastern side of the site. Noise levels are anticipated to remain similar to present conditions under the "No Action" alternative. The proposed wind turbines have maximum noise levels of 35-45 decibels at a distance of 1,000 ft away. The small amount of noise generated by the turbine is not considered to be a significant impact, given the magnitude of the sound and the fact that noise levels from different sources are not additive, and noise attenuates logarithmically with distance to the receptor.

Evaluation of noise is somewhat subjective, depending upon the human subject. The table below describes typical sound pressures associated with different activities and provides a baseline for evaluation potential wind turbine noise impacts.

Table 4-1. Typical Noise Levels Related to Sound Pressure



Source: Canadian Centre for Occupational Health and Safety

Wind turbines commonly produce some broadband noise (a swishing sound) as the blades rotate. Modern turbine designs have nearly eliminated tonal noises such as humming and whining from the turbine itself. Because TRACEN is located in a windy location, the background noise of the wind itself is likely to mask most of the sound generated by the turbine.

Because anything with moving parts will generate sound, the analysis of potential noise impacts compares typical wind turbine sound output with the table above and Table 4-2 below.

Table 4-2. Typical Noise Levels Associated with Human Activity

Source/Activity	Indicative noise level dB (A)
Threshold of hearing	0
Rural night-time background	20-40
Quiet bedroom	35
Wind farm at 350m	35-45
Car at 40mph at 100m	55
Busy general office	60
Truck at 30mph at 100m	65
Pneumatic drill at 7m	95
Jet aircraft at 250m	105
Threshold of pain	140

Source: The Scottish Office, Environment Department, Planning Advice Note, PAN 45, Annex A: Wind Power, A.27. Renewable Energy Technologies, August 1994. Cited in "Noise from Wind Turbines," British Wind Energy Association, http://www.britishwindenergy.co.uk/ref/noise.html .

Review of these tables indicates that a wind farm typically generates less noise than vehicles moving at 40 miles an hour on roadway, and slightly more than a quiet bedroom. These figures are for a wind farm with multiple turbines; TRACEN proposes two turbines, so the noise generated is not anticipated to be a significant impact.

Based on the distance from the two proposed turbine locations to the nearest off-base residences that are not on Federal property (approximately 0.25 miles), no significant noise impacts are anticipated. In fact, the second proposed location, Buoy Yard 1, is now 1200 ft further away from the nearest residence.

CHAPTER 5
SUMMARY OF ANY SIGNIFICANT IMPACTS AND REQUIRED MITIGATION

The following is a brief summary of the potential significant impacts from the project and the mitigation proposed to address them:

- While some impacts could potentially occur to migratory birds such as passerines, raptors or shorebirds as a result of individuals colliding with the tower or blades, these potential impacts would be mitigated reducing operations during key migratory periods.
- Impacts could occur to migratory bats from the same factors but these impacts could be mitigated by post-construction monitoring for potential bat fatalities and reducing operations as needed during key migratory periods, especially during early morning and early evening hours during the months of August through October, and when wind speeds are less than 5m/second.
- While impacts to the view shed are anticipated to influence the aesthetics of the area as viewed by the Route 9 bridge, Poverty Beach, and some of the nearby residences as shown in Figures 4-2A through 4-4B, these impacts are not considered to be significant.

CHAPTER 6
RELATIONSHIP BETWEEN SHORT-TERM USE OF THE ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The proposed project would result in maintenance and enhancement of long-term productivity of TRACEN by providing a renewable energy source that would help USCG become more self-sufficient with respect to energy production; the installation would also be more secure and less reliant on an outside energy source as a result.

The near-term impacts from construction activities would not be considered significant Post – construction studies will be performed to confirm actual impacts.

CHAPTER 7
IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The two proposed turbines would not require significant increases in manpower or resources in order to operate and maintain. By implementing the proposed project, USCG would be committing federal funds to the project which would be irreversible and irretrievable. Should the wind turbine project not be as economically viable as envisioned, or environmental impacts may be more significant than anticipated, USCG could still reconnect to the existing electricity grid. However, the capital investment would remain irretrievable.

CHAPTER 8
CONSIDERATION OF SECONDARY AND CUMULATIVE IMPACTS

Under the “No Action” Alternative, cumulative impacts on a larger scale will remain. As a result, the TRACEN installation will continue to indirectly contribute to regional air and water pollution, with resultant indirect impacts to fish and wildlife and ecosystem function. By purchasing renewable energy from off-site sources TRACEN would reduce dependence on electricity produced by fossil fuels, but not to the same extent as under the Preferred Alternative.

The installation’s ongoing reliance on electricity produced from fossil fuels will continue to indirectly contribute to: carbon emissions, atmospheric pollution from coal-fired power plants (in the form of NOX, sulfur dioxide, VOCs, and particulates containing mercury and other heavy metals), freshwater consumption at utility power plants, land use (for transmission lines, fuel storage, and waste disposal), and pressure to further develop remaining fossil fuel reserves. TRACEN's contribution to these negative environmental impacts in the "No Action" Alternative and will drop dramatically (by 75%) with implementation of the Preferred Alternative.

No significant secondary impacts are anticipated from the proposed wind turbine project since it would be located entirely at TRACEN and would not affect growth of the area, road construction, or other secondary impacts associated with typical development projects.

The potential exists for cumulative impacts to migratory bird and bat populations should other turbines be constructed on the Cape May peninsula, or other areas of critical habitat. While several current informal proposals exist, USCG is unaware of any permitted or approved projects currently planned for construction. It is recommended that the possibility of cumulative impacts be evaluated through a sound monitoring program for this project to ensure that *individual* project impacts are minimized to levels that would remain insignificant even if additional turbines are eventually constructed by others in the future.

CHAPTER 9
NEW JERSEY COASTAL ZONE MANAGEMENT CONSISTENCY

9.1 Compliance Summary

TRACEN is a Federal installation and is exempt from state CAFRA regulators However, in planning the project, the USCG has considered the Rules on Coastal Zone Management (CZM) found at NJ.A.C. 7:7E-1 et seq. The following is a summary of state CZM registrations considered.

9.2 Special Areas (N.J.A.C. 7:7E-Subchapter 3)

No special areas are located on TRACEN.

9.2.1 Shellfish Habitat (N.J.A.C. 7:7E-3.2)

The portion of the site affected by the proposed project is entirely upland. Shellfish habitat would be unaffected.

9.2.2 Surf Clam Areas (N.J.A.C. 7:7E-3.3)

The portion of the site affected by the proposed project is entirely upland. Surf clam areas would remain unaffected.

9.2.3 Prime Fishing Areas (N.J.A.C. 7:7E-3.4)

As TRACEN is a federal military installation, commercial fishing is not permitted on base. Some recreational fishing is enjoyed by Coast Guard personnel, federal employees and federal retirees on the jetty. These resources would remain unaffected by construction of a wind turbine.

9.2.4 Finfish Migratory Pathways (N.J.A.C. 7:7E-3.5)

The portion of the site affected by the proposed project is entirely upland. Finish migratory pathways would remain unaffected.

9.2.5 Submerged Vegetation Habitat (N.J.A.C. 7:7E-3.6)

The portion of the site affected by the proposed project is entirely upland. Submerged vegetation habitats would remain unaffected.

9.2.6 Navigation Channels (N.J.A.C. 7:7E-3.7)

The portion of the site affected by the proposed project is entirely upland. Any construction activities would be conducted under a soil erosion and sediment control permit and would include measures to avoid siltation to navigation channels. Navigation channels would remain unaffected.

9.2.7 Canals (N.J.A.C. 7:7E-3.8)

The portion of the site affected by the proposed project is entirely upland. Canals would remain unaffected.

9.2.8 Inlets (N.J.A.C. 7:7E-3.9)

The portion of the site affected by the proposed project is entirely upland. Inlets would remain unaffected.

9.2.9 Marina Moorings (N.J.A.C. 7:7E-3.10)

The portion of the site affected by the proposed project is entirely upland. Marina moorings would remain unaffected.

9.2.10 Ports (N.J.A.C. 7:7E-3.11)

The portion of the site affected by the proposed project is entirely upland. Ports would remain unaffected.

9.2.11 Submerged Infrastructure Routes (N.J.A.C. 7:7E-3.12)

The portion of the site affected by the proposed project is entirely upland. Submerged infrastructure routes would remain unaffected.

9.2.12 Shipwrecks and Artificial Reefs (N.J.A.C. 7:7E-3.13)

The portion of the site affected by the proposed project is entirely upland. Shipwrecks and artificial reefs would remain unaffected.

9.2.13 Wet Borrow Pits (N.J.A.C. 7:7E-3.14)

The portion of the site affected by the proposed project is entirely upland. Wet borrow pits would remain unaffected.

9.2.14 Intertidal and Subtidal Shallows (N.J.A.C. 7:7E-3.15)

The portion of the site affected by the proposed project is entirely upland. Intertidal and subtidal shallows would remain unaffected.

9.2.15 Dunes (N.J.A.C. 7:7E-3.16)

The portion of the site affected by the proposed project is entirely upland. Dunes would remain unaffected.

9.2.16 Overwash Areas (N.J.A.C. 7:7E-3.17)

No areas landward of a beach or dune that are subject to an accumulation of sediment exist within the area proposed for construction.

9.2.17 Coastal High Hazard Areas (N.J.A.C. 7:7E-3.18)

There are no high velocity waters as mapped by FEMA within the project area.

9.2.18 Erosion Hazard Areas (N.J.A.C. 7:7E-3.19)

Due to the relatively flat topography of TRACEN, there is very little erosion or history of erosion. Through the use of an approved Soil Erosion and Sediment Control Plan, all disturbed soils would be stabilized during construction. While the harbor shoreline is in close proximity to the two proposed turbine locations, the nearest erodible beach area is located at Poverty Beach on the southern side of TRACEN, over 1000 ft away.

9.2.19 Barrier Island Corridor (N.J.A.C. 7:7E-3.20)

Not applicable. No barrier islands exist within the project area.

9.2.20 Bay Islands (N.J.A.C. 7:7E-3.21)

Not applicable. No bay islands exist within the project area.

9.2.21 Beaches (N.J.A.C. 7:7E-3.22)

Not applicable. The nearest beach, as defined under N.J.A.C. 7:7E-3.22 is located over 1,000 ft from the two proposed turbines.

9.2.22 Filled Water's Edge (N.J.A.C. 7:7E-3.23)

No shoreline areas, such as the USCG mooring area would be affected by the proposed project. The buoy yard area is within 500 ft of the water’s edge and hence would require waterfront development permit equivalency but would not affect the water’s edge.

9.2.23 Existing Lagoon Edge (N.J.A.C. 7:7E-3.24)

Not applicable.

9.2.24 Flood Hazard Areas (N.J.A.C. 7:7E-315)

The drainage characteristics of the installation would remain unaffected by the proposed project. Since the turbine towers would be set on pilings, they would be designed to withstand the 100-year flood. Construction may require flood hazard area permit equivalency from NJDEP regulations.

9.2.25 Wetlands

Freshwater wetlands would not be impacted by the proposed project.

9.2.26 Wetland Buffers (N.J.A.C. 7:7E-3.28)

The proposed project is located outside of wetland transition areas.

9.2.27 Coastal Bluffs (N.J.A.C. 7:7E-3.31)

Not applicable. No coastal bluffs are located within the area proposed for construction.

9.2.28 Intermittent Stream Corridors (N.J.A.C. 7:7E-3.32)

Not applicable. No intermittent stream corridors are located within the area proposed for construction.

9.2.29 Farmland Conservation Areas (N.J.A.C. 7:7E-3.33)

Not applicable. No farmland conservation areas are located within the area proposed for construction.

9.2.30 Steep Slopes (N.J.A.C. 7.7E-3.34)

Not applicable. No steep slopes are located within the area proposed for construction.

9.2.31 Dry Borrow Pits

Not applicable. No dry borrow pits are located within the area proposed for construction.

9.2.32 Historic and Archaeological Resources (N.J.A.C. 7:7E-3.36)

No historical or archaeological resources would be affected by construction of the turbine tower.

9.2.33 Critical Wildlife Habitats (N.J.A.C. 7:7E-3.39)

The Poverty Beach area on the south edge of TRACEN has provided habitats for least terns and nesting piping plovers. Impacts to these species would not be biologically significant. The potential for impacts to these species would be addressed by the mitigation plan in Section 4.

9.2.34 Public Open Space (N.J.A.C. 7:7E-3.40)

Not applicable.

9.2.35 Special Hazard Areas (N.J.A.C. 7:7E-3.41)

The proposed project is not in a special hazard area.

9.2.36 Excluded Federal Lands (N.J.A.C. 7:7E-3A2)

TRACEN is considered Federal land exempt from state CAFRA regulations; as described in N.J.A.C. 7:7E-3A2.

9.2.37 Special Urban Areas (N.J.A.C. 7:7E-3.43)

Not applicable. No special urban areas exist within the project area.

9.2.38 Pinelands National Reserve (N.J.A.C. 7:7E-3.44)

Not applicable.

9.2.39 Wild and Scenic River Corridors (N.J.A.C. 7:7E-3.46)

Not applicable.

9.2.40 Geodetic Control Reference Marks (N.J.A.C. 7:7E-3.47)

Geodetic control reference marks are defined as "traverse stations and benchmarks established or used by the New Jersey Geodetic Control Survey." These reference marks provide the horizontal and vertical references used by land surveyors and engineers to determine elevations and specific locations. No geodetic reference marks would be disturbed within the project footprint.

9.2.41 Hudson River Waterfront Area (N.J.A.C. 7:7E-3.48)

Not applicable. This project does not fall within the Hudson River waterfront.

9.3 General Water Areas (N.J.A.C. 7:7E-Subchapter 4)

General Water Areas is divided into two categories using the same definitions for Water and Land used for Special Areas. They are then classified into eight categories based upon volume and flushing rate. These categories are:

- Lakes, ponds, and reservoirs;
- Large rivers (watersheds greater than 1000 square miles);
- Manmade harbors;
- Medium rivers, creeks, and streams (watersheds less than 1000 square miles);
- Ocean;
- Open bay;
- Semi-enclosed and back bay; and
- Tidal guts or thoroughfares.

Some of these General Water Areas exist within TRACEN. However, none would be affected by the proposed project.

9.3.1 Filling (N.J.A.C. 7:7E- 4.10)

No fill would be required other than pilings and concrete foundations for the tower.

CHAPTER 10
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