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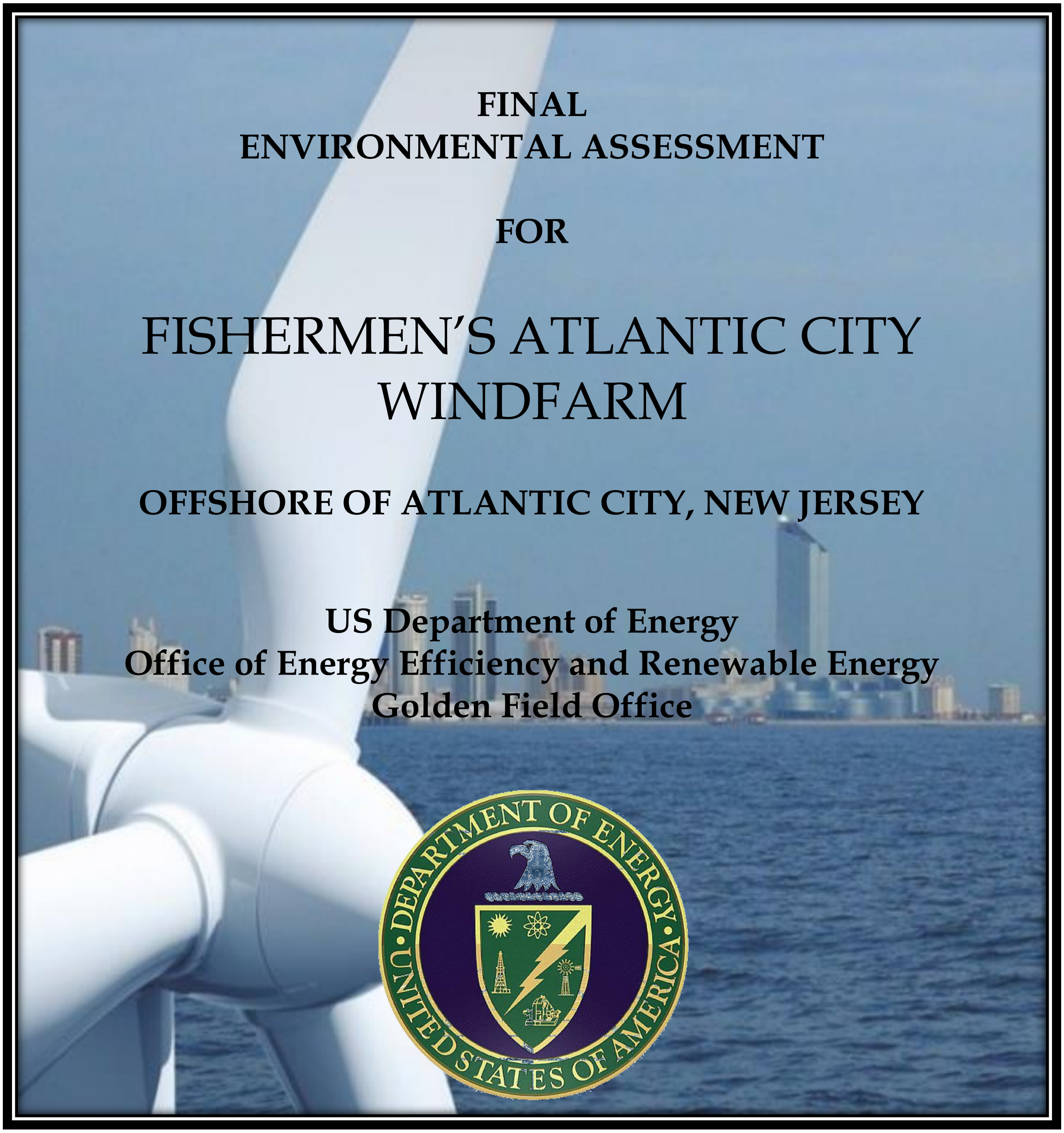

FINAL
ENVIRONMENTAL ASSESSMENT

FOR

FISHERMEN'S ATLANTIC CITY WINDFARM

OFFSHORE OF ATLANTIC CITY, NEW JERSEY

US Department of Energy
Office of Energy Efficiency and Renewable Energy
Golden Field Office

December 2015

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ACRONYMS AND ABBREVIATIONS

AC	alternating current
ACBC	Atlantic City – Brigantine Connector
ACE	Atlantic City Expressway
ACUA	Atlantic County Utilities Authority
AMEC	AMEC Environment & Infrastructure, Inc.
APE	area of potent effects
AQCR	Air Quality Control Region
AWS	AWS Truewind, LLC
BGEPA	Bald and Golden Eagle Protection Act
BOEM	Bureau of Ocean Energy Management
BPU	Board of Public Utilities
CAA	Clean Air Act
CAAA	Clean Air Act Amendments
CAFRA	Coastal Area Facilities Review Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
DA	Department of Army
dB	decibels
DLUR	Division of Land Use Regulation
DOE	United States Department of Energy
DOI	Department of the Interior
EA	Environmental Assessment
EBS	Ecological Baseline Study
EDA	Economic Development Authority
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EMF	Electromagnetic Field
ESA	Endangered Species Act
°F	degrees Fahrenheit
FAA	Federal Aviation Administration
FACW	Fishermen’s Atlantic City Windfarm, LLC
FOA	Funding Opportunity Announcement
FONSI	Finding of No Significant Impact
FR	Federal Register
GIS	geographical information system
GMI	GeoMarine, Inc.
HDD	Horizontal Directional Drilling
HDPE	High Density Polyethylene
HUC	Hydrologic Unit Code
Hz	Hertz
IBGS	Inward Battered Guide Structure
IHA	Incidental Harassment Authorization
KACY	(observation station at) Atlantic City International Airport
kWh	kilowatt hour
kV	Kilovolt
LIDAR	Light Detection and Ranging
LOC	Letter of Concurrence
LCOE	levelized cost of energy
µPa	microPascal
MBTA	Migratory Bird Treaty Act
MLLW	Mean Lower Low Water
MMPA	Marine Mammal Protection Act
MMS	Minerals Management Service
MOU	Memorandum of Understanding
mph	miles per hour
m/s	meters per second
msl	mean sea level
MW	megawatt(s)
Mwh	megawatt hour(s)
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NCDC	National Climatic Data Center
NEES	North East Ecological Services
NELI	New England-Long Island Interconnector
NEPA	National Environmental Policy Act

N.J.A.C.	New Jersey Administrative Code
NJDEP	New Jersey Department of Environmental Protection
NJGS	New Jersey Geological Survey
N.J.S.A.	New Jersey Statutes Annotated
NJSWQS	New Jersey Surface Water Quality Standards
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NO_x	nitrogen oxides
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NTL	Notice to Lessees and Operators
NWI	National Wetlands Inventory
NWP	Nationwide Permit
O_3	ozone
OCS	Outer Continental Shelf
OCSLA	Outer Continental Shelf Lands Act
OREC	Offshore Wind Renewable Energy Certificate
OSRP	Oil Spill Response Plan
OTR	Ozone Transport Region
Pb	lead
PJM	Pennsylvania – New Jersey – Maryland Interconnection
PL	Public Law
PM_{10}	particulate matter less than or equal to 10 micrometers
$PM_{2.5}$	particulate matter less than or equal to 2.5 micrometers
PN	Public Notice
ppt	parts per thousand
PVC	polyvinyl chloride
RSZ	Rotor Swept Zone
SAP	Site Assessment Procedures
SAV	Submerged Aquatic Vegetation
SEL	sound exposure level
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SPL	Sound Pressure Level
SO_2	sulfur dioxide
SOW	Scope of Work
TCM	Turbine Condition Monitoring
TMDL	total maximum daily loads
tpy	tons per year
TSS	total suspended solids
USACE	United States Army Corps of Engineers
USC	United States Code
USCCSP	US Climate Change Science Program
USCG	United States Coast Guard
USDOE	United States Department of Energy
US	United States
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VOC	volatile organic compound
WEA	Wind Energy Areas

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SECTION 1
INTRODUCTION

1.1 National Environmental Policy Act

The National Environmental Policy Act (NEPA; 42 US Code [USC] § 4321 et seq.), the Council on Environmental Quality's (CEQ's) NEPA regulations (40 Code of Federal Regulations [CFR], Parts 1500 to 1508), and the US Department of Energy's (DOE's) NEPA implementing procedures (10 CFR Part 1021) require that DOE consider the potential environmental impacts of a proposed action before making a decision. This requirement applies to DOE's decisions about whether to provide awards of financial assistance.

In compliance with these regulations, this Environmental Assessment (EA):

- Examines the potential environmental impacts of the Proposed Action and the No-Action Alternative;
- Identifies unavoidable adverse environmental impacts of the Proposed Action;
- Describes the relationship between local short-term uses of the human environment and the maintenance and enhancement of long-term productivity; and
- Characterizes any irreversible and irretrievable commitments of resources that would be involved should DOE decide to implement its Proposed Action.

DOE must meet these requirements before making a final decision to proceed with any proposed federal action that could cause adverse impacts to human health or the environment. This EA provides DOE and other decision makers the information needed to make an informed decision about the Proposed Action. The EA evaluates the potential individual and cumulative impacts of the Proposed Action. An evaluation of a No Action Alternative is required under the DOE NEPA implementing regulations. Under the No Action Alternative, DOE would not authorize expenditure of federal funds for the Proposed Action. Although this Project could proceed if DOE decided not to provide financial assistance, the Department has assumed, for the purposes of comparison in this EA, that the Project would not proceed without its assistance. If the Project proceeded without DOE assistance, the potential impacts would be essentially identical to those under the DOE Proposed Action (that is, providing assistance that enables the Project to proceed).

1.2 Background

On February 7, 2011, DOE released the National Offshore Wind Strategy, in partnership with the Department of the Interior (DOI). The Strategy includes and addresses two critical objectives in pursuit of overcoming barriers to commercial offshore wind development in the US:

- Reducing the cost of energy through technology development to ensure competitiveness with other electrical generation sources; and
- Reducing deployment timelines and uncertainties limiting US offshore wind project development.

Subsequently in March 2012, DOE issued Funding Opportunity Announcement (FOA) Number: DE-FOA-0000410 *US Offshore Wind: Advanced Technology Demonstration Projects* (henceforth referred to as the FOA) to provide support for regionally-diverse Advanced Technology Demonstration Projects through collaborative partnerships. The primary goals of the Advanced Technology Demonstration Projects are to:

- Install innovative offshore wind systems in US waters in the most rapid and responsible manner possible; and
- Expedite the development and deployment of innovative offshore wind energy systems with a credible potential for lowering the levelized cost of energy (LCOE).

By providing funding, technical assistance, and government coordination to accelerate deployment of these demonstration projects, DOE can help eliminate uncertainties, mitigate risks, and support the private sector in creating a robust US Offshore Wind Energy Industry. DOE is using projects selected under this FOA to assess progress towards these national-scale goals. Initially seven applicants were selected by DOE for negotiation of award under the FOA. The awards were divided up into five distinct budget periods. Upon completion of budget period 1, DOE conducted a down-select decision, whereby only three of the seven applicants will be eligible for funding for budget period 2-5. Fishermen's Atlantic City Windfarm, LLC (FACW) was one of three projects selected by DOE.

DOE is proposing to provide funding to FACW, an offshore wind-energy development company, to support the development of an offshore wind renewable energy facility within New Jersey State Waters located approximately 2.8 miles off the New Jersey coast from Atlantic City. This Proposed Project would consist of up to six wind turbine generators that would generate up to approximately 25 Megawatts (MW) of electricity and the necessary electrical transmission facilities (i.e., undersea and underground cable) to connect the wind farm to an existing electrical substation, located in Atlantic City, for interconnection to the regional power grid (Proposed Project) (see **Appendix A** and **Figure 1**). Electrical power generated from the Proposed Project would be sold to the market through the state's energy regulating agency, the Board of Public Utilities (BPU), or directly to a large independent power consumer.

FACW started the various state and federal permitting processes for their offshore wind farm in 2009 (summarized in **Section 2.5**). Public input was received during one community event and twice during state and federal permitting processes. State and federal agency consultation has been completed as part of permitting. To date, all required state and federal permits have been obtained for the offshore wind farm. The US Army Corps of Engineers (USACE) prepared an EA per USACE regulations (33 CFR Part 325 Appendix B), and as required by NEPA as part of their Department of Army (DA) permitting process. During the permit review, the USACE received concurrence under Section 7 of the Endangered Species Act from the US Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS). Concurrence was also obtained from NMFS regarding the impact of the Project on Essential Fish Habitat (EFH) under the Magnuson Stevens Fisheries Conservation Act. The USACE also coordinated with the US Coast Guard (USCG) regarding issues related to navigation, with the US Environmental Protection Agency (USEPA) regarding air quality, and Federal Aviation Administration (FAA) regarding aviation safety. This was undertaken as part of the USACE public interest review that is carried out in the DA permit review process. The USACE is a cooperating agency in the development of this EA due to the applicant's need to modify the existing DA permit. Project has been modified since issuance of the DA permit, and

Figure 1. Project turbine locations and cable routing near Atlantic City, New Jersey

DOE is reviewing the entire scope of the modified Project; USACE is only reviewing those portions of the original Project that have been modified. The USACE issued a public notice for the proposed permit modification on February 26, 2015.

DOE has prepared this EA to evaluate the potential environmental impacts of providing funding to FACW for the design, construction, operation, maintenance and eventual decommissioning of the proposed offshore wind farm (the Proposed Action). This EA also evaluates the impacts that could occur, if DOE did not provide funding (No-Action Alternative), under which DOE assumes the Project would not proceed. Although this Project could proceed if DOE decided not to provide financial assistance, the Department has assumed, for the purposes of comparison in this EA, that the Project would not proceed without its assistance. If the Project proceeded without DOE assistance, the potential impacts would be essentially identical to those under the DOE Proposed Action (that is, providing assistance that enables the Project to proceed).

1.3 Purpose and Need

Through the *US Offshore Wind: Advanced Technology Demonstration Projects* FOA, DOE is providing support for regionally-diverse Advanced Technology Demonstration Projects through collaborative partnerships to support DOE's and DOI's National Offshore Wind Strategy. The purpose of the Advanced Technology Demonstration Projects is to verify innovative designs and technology developments and validate full performance and cost under real operating and market conditions. The proposed action would fulfill DOE's goals of installing innovative offshore wind systems in US waters in the most rapid and responsible manner possible and expedite the development and deployment of innovative offshore wind energy systems with a credible potential for lowering the LCOE.

Offshore wind energy can help the nation reduce its greenhouse gas emissions, diversify its energy supply, provide cost-competitive electricity to key coastal regions, and stimulate economic revitalization of key sectors of the economy. However, if the nation is to realize these benefits, key challenges to the development and deployment of offshore wind technology must be overcome, including the relatively high current cost of energy, technical challenges surrounding installation and grid interconnection, and the untested permitting or approval processes. Accordingly, there is a need to reduce the cost of energy through technology development to ensure competitiveness with other electrical generation sources; and to reduce deployment timelines and uncertainties limiting US offshore wind project development.

1.4 Public and Agency Involvement

NEPA requirements help ensure that environmental information is made available to the public during the decision-making process and prior to actions being taken. The premise of NEPA is that the quality of decisions will be enhanced if proponents provide information to the public and involve the public in the planning process.

Public input and agency consultation completed as part of the design and permitting process for FAWC offshore wind farm is described in **Section 2.5** of this EA. On June 14, 2012, the US Army Corps of Engineers (USACE) issued a Department of the Army Individual Permit for the Proposed Project. In

December 2014, FACW submitted a permit modification package to USACE. Since modification of the USACE permit requires additional NEPA review and re-initiation of federal consultations, DOE invited the USACE to become a cooperating agency in the development of the DOE EA. In addition, to streamline processes and prevent duplication of efforts both agencies agreed to jointly re-initiate consultations for the Proposed Project. A copy of agency correspondence is attached in **Appendix C**.

In addition, the Draft EA was made available for a 30 day public comment period starting March 5, 2015. A Notice of Availability was published in the press of Atlantic City Newspaper on March 5, 2015, March 6, 2015 and March 8, 2015. DOE also provided a copy of the Notice of Availability to stakeholders on March 5, 2015. Stakeholders notified included federal, tribal, state, and local governments, other interested organizations, and landowners within and near the Proposed Action area. A public informational meeting was held on March 10, 2015 in Atlantic City, New Jersey. During the public comment period, three comment letters were received from members of the public and two comment letters were received from state and federal agencies. A copy of the Notice of Availability, a comment response matrix, and all public comments received is attached in **Appendix D**. These public comments were all considered in the preparation of the Final EA.

SECTION 2
PROPOSED ACTION AND ALTERNATIVES

The following section describes the Proposed Action, the Proposed Project, as well as alternatives to the action.

2.1 Proposed Action

Under the Proposed Action, DOE would authorize FACW to expend federal funding to design, construct, operate, maintain, and eventually decommission the wind farm as described in the following section. The USACE is processing a modification to the previously issued Department of the Army permit.

DOE has authorized FACW to use a percentage of the federal funding for preliminary activities, which include preparing this EA, information gathering, site analysis, design simulations, permitting and environmental surveys. Such activities are associated with the Proposed Action and do not significantly impact the environment nor represent an irreversible or irretrievable commitment by DOE in advance of its conclusion of the potential environmental impacts from the Proposed Action.

2.2 FACW Proposed Project

2.2.1 Description of the Proposed Project

The Proposed Project consists of the construction, operation, maintenance, and eventual decommissioning of nominal 25 MW offshore wind renewable energy facility, consisting of up to six turbines, a 33-kiloVolt (kV) alternating current (AC) submarine cable interconnecting the turbines (inter-array cable), a 33-kV AC submarine transmission cable (export cable), and a 33-kV AC underground cable (onshore interconnection cable) that would connect the Proposed Project with existing onshore infrastructure located in Atlantic City, New Jersey. Interconnection with the existing onshore infrastructure would require onshore switchboxes and minor electrical components.

The offshore components of the Proposed Project, including the turbines and the inter-array cable, would be located in state waters approximately 2.8 nautical miles from Atlantic City, New Jersey. The export cable would traverse state waters to shore. The onshore components, including the onshore interconnection cable, fiber optic cable, and interconnection facilities would be located in Atlantic City, New Jersey. Construction would be supported by a construction staging area(s) and a construction port. Onshore support facilities would be located at existing waterfront industrial or commercial sites in the cities of Camden and Atlantic City, New Jersey.

Each turbine would have a name plate capacity of no more than 5 MW and a blade rotor diameter of no more than 427 feet. The turbine array would be oriented in one row parallel to the coastline running northeast to southwest. Spacing between the turbines would be approximately 3,543 feet. Each of the wind turbines would be supported by a jacket-type foundation, consisting of steel pipe piles for anchoring into the seabed, and a steel center caisson onto which the transition piece and turbine tower would be installed.

The inter-array transmission cable from each turbine would be linked to the export cable that would make landfall at a point in Atlantic City (**Figure 5**), and then continue underground to the existing Huron Substation, located along Absecon Avenue.

The total ocean area considered as the Project area is approximately 170 acres (calculated as the perimeter around the group of six turbines, approximately 200 feet in each direction) plus a 5 foot width along the length of the export cable route from the turbines to the shore); however the actual portion of the area that would be physically disturbed by the placement of the turbines and cables is approximately 2 acres. The cable and turbines would be located in water depths of 26 to 40 feet below mean lower low water (MLLW).[1]

2.2.2 Selection of the Project Area

The proposed turbine locations were selected to maximize wind energy potential while minimizing visual impacts by orienting the turbines parallel to the shore to create a uniform appearance, and by locating them as far offshore as possible given the criteria identified below, while still remaining within state waters. The criteria utilized to identify possible Project locations were:

- Wind resource characteristics, with a greater energy yield potential associated with stronger average wind speed
- Bathymetric considerations or ocean bottom depth and features, including the following tradeoffs:
    - Minimizing the range of water depth across the site to allow a standardized foundation design to be used since design construction and capital costs increase as water depths increase
    - Minimizing water depth to decrease wave load stresses on foundations and turbines which increase as water depth decreases
- The availability of an electrical grid interconnection close to the shore with a capacity to accept 25 MW
- Environmental and physical constraints including artificial reefs, existing subsea cables, restricted airspace proximate to airports, marine traffic routes and proximity to sensitive ecological habitats, including a focus on avian species and their movements around and through the Project area

Wind resources in the Project area have been studied through weather monitoring buoys and remote sensing (Light Detection and Ranging [LIDAR] technologies), as well as through a study on coastal New Jersey wind resources (AWS Truewind, LLC 2008). Data collection efforts began in 2010 with the installation of a traditional meteorological buoy, which was later replaced with a floating LIDAR system. A wind data collection system has remained onsite nearly continuously since the first deployment. Data collected have been used to support wind energy analysis and structural design efforts. The estimated frequency and energy distribution by direction plot (wind rose) produced by AWS indicates a circular distribution of the wind. Research also determined that the mean wind speeds ranged from approximately 7.00 to 8.25 meters per

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[1] MLLW is the average height of the lowest tide recorded at a tide station each day during the recording period.

second (m/s) from within Absecon Inlet out to 3.0 nautical miles offshore, making the area ideal for the placement of wind energy turbines.

The site selection process for the Proposed Project resulted in the identification of a site that would have a minimum alteration of natural tidal circulation and bottom topography, and would have the minimum alteration of natural contours or wetlands.

2.2.3 Wind Turbine and Foundation Design

Engineering design of the structures requires that all components are able to withstand environmental conditions experienced during a 100-year return interval storm event. Based on historical studies of site conditions and a MetOcean Solutions Ltd report developed specifically for this Project area, the 100 year storm conditions present maximum wind speeds of 112 miles per hour (mph) and maximum wave heights of 37 feet.

The offshore turbine assemblies would each be composed of three primary elements, a foundation, tower, and three blade turbine as shown in **Figure 2**. **Appendix A** contains an additional depiction of the turbine design. Dimensions and key elevations of the turbine structures are provided below in **Table 2-1**. Each tower would be approximately 16.5 feet in diameter at the base and taper to a diameter of 12.5 feet at the top.

Table 2-1. Dimensions and Key Elevations of the Wind Turbine Structures

Key Elevations	Feet
Piling penetration into seabed	150
Top of foundation	50
Lower blade height	84
Turbine hub height	297
Upper blade height	511
Elevations reference mean low or lower water (MLLW).	

The turbine foundation (**Figure 3**) would be a jacket-type design, consisting of steel pipe piles for anchoring into the seabed, and a steel center caisson onto which the tower would be installed. The pilings would extend approximately 150 feet into the seabed with the top of the foundation extending approximately 50 feet above MLLW. **Table 2-1** provides more details on the design measurements.

The wind turbines would be comprised of the generator and hub which are enclosed within the turbine nacelle, and the turbine blades. The nacelle houses the major mechanical components of each turbine.

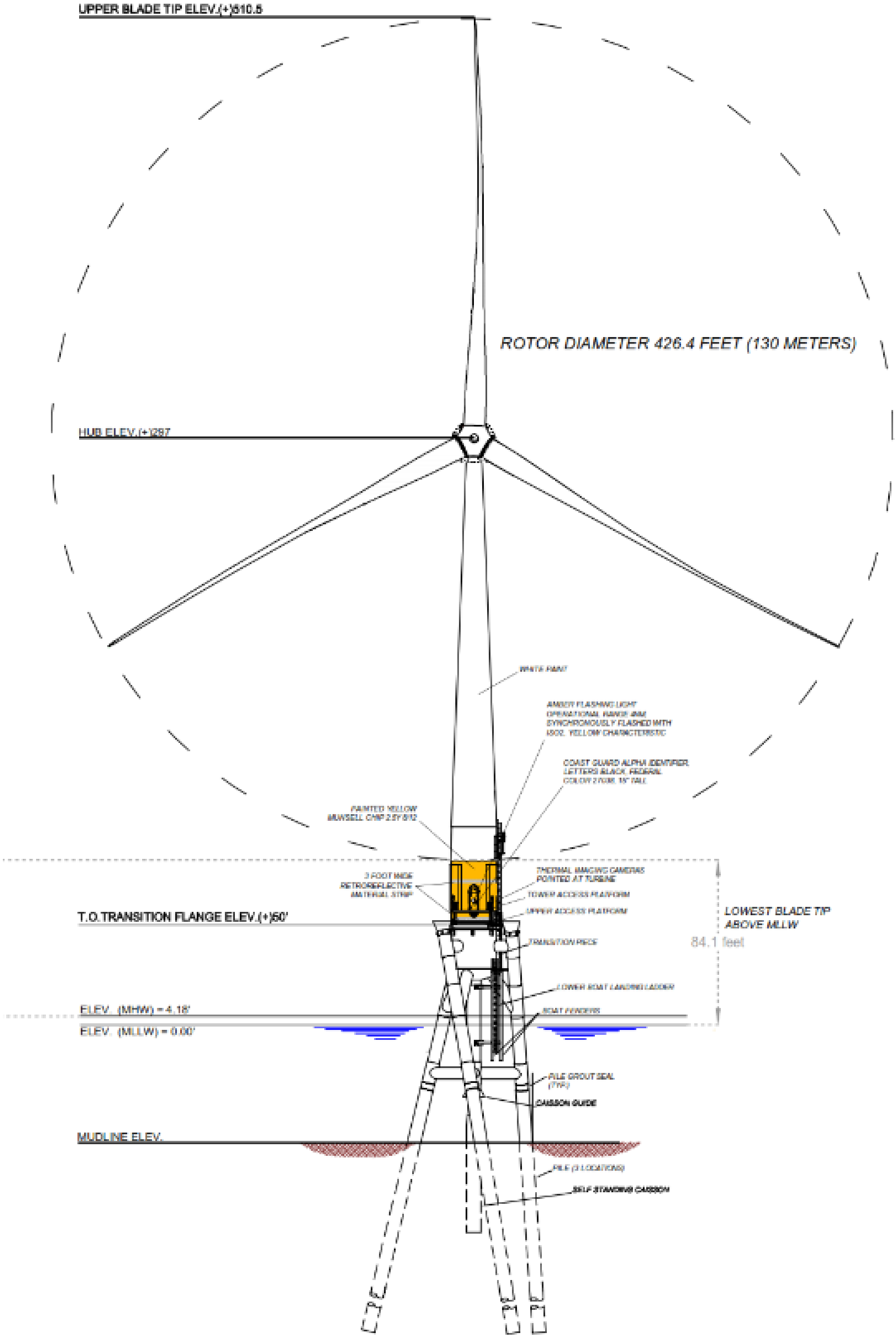

Figure 2. Offshore wind turbine detail for the Proposed Project.

2.2.4 Installation of Turbines and Foundations

FACW has thoroughly investigated vessel and port availability, and is currently in negotiations with multiple third parties to provide equipment and expertise in the installation of the turbine foundations and turbines. FACW has identified suitable existing US Jones Act-compliant vessels capable of installing the turbines in the 40 foot water depths at the Project site. Specialty contractors would be required for delivery and installation of foundations, turbines and the subsea electrical cabling. Installing the array of turbines will require the ability to lift, place, and connect foundations, pilings, nacelles, blades and heavy electrical equipment. These components can weigh well in excess of 200 tons each, and can only be lifted with specialized jack up barges or vessel-mounted cranes offering a stable, safe work platform.

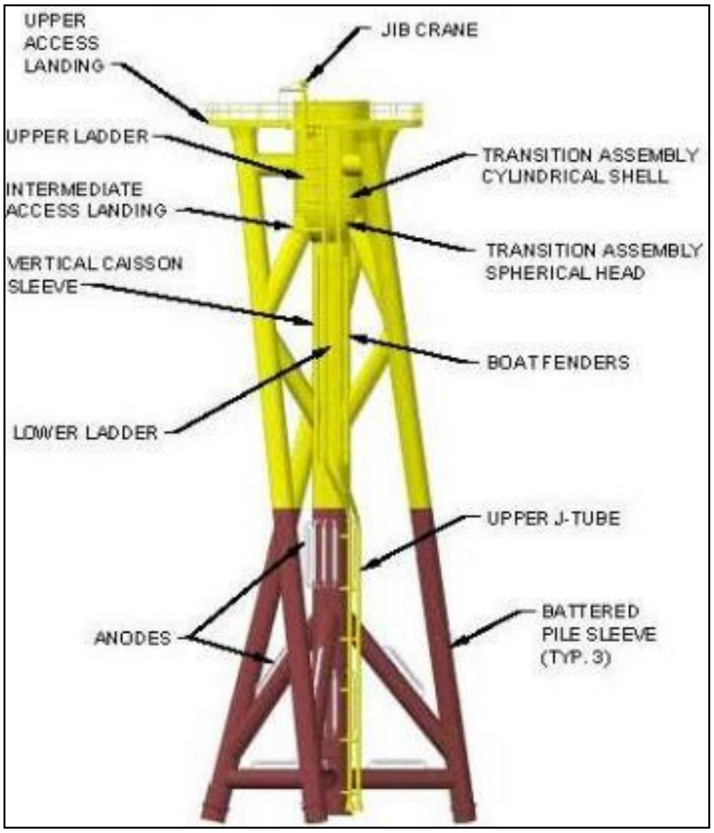

Figure 3. Foundation design for the Proposed Project

The original New Jersey Department of Environmental Protection (NJDEP) Multiple Permit Application included the monopiles that would have been driven to a depth of 150 feet below the mud line, a depth which was already permitted. The newly proposed use of an Inward Battered Guide Structure (IBGS) for the foundations would be installed at the same depth, but would require a smaller hydraulic or vibratory hammer compared to the originally permitted monopile foundation (Keystone Engineering, Inc. 2014). The geometry of the IBGS foundation design transfers the sideways forces on the turbines (from the wind) along the sloped legs and into the seafloor, so that the soil is “more efficient” in supporting the structure and turbine above. Most soils are inherently better in axial capacity than lateral capacity. A total of four drilled soil borings, seven Cone Penetration Test Probes, and 16 vibracores were performed at the six proposed turbine locations, and along the proposed undersea transmission cable route. Soil borings and probes were utilized to identify subsurface conditions, and to determine strength and deformation characteristics of the encountered soils for use in monopole foundation design (Langan Engineering & Environmental Services 2010). Vibracores were collected to allow the archeological study of near surface sediments (see **Section 3.5**), and to obtain soil thermal and electrical properties for cable design. This structure design has been used to support two oil and gas platforms in the Gulf of Mexico. The initial foundation withstood hurricane Katrina, a 400-year return period ocean condition with no damage, proving the inherent robustness of the foundation. In October 2011, the Hornsea Met Mast foundation was installed in UK Round 3 waters to support a meteorological mast, which proved the installation techniques in North Sea conditions. Push-over analysis has shown that the structure has reserve strength ratio slightly greater than a typical four-pile jacket (Keystone Engineering, Inc. 2014).

FACW currently has a Memorandum of Understanding with the South Jersey Port Corporation for materials staging and preparation. The turbines and associated major components are envisioned to be delivered to the Beckett Street Marine Terminal in Camden, New Jersey. Up to 6 months before the scheduled installation, the turbines would be transported from the manufacturer to the Beckett Street Marine Terminal via barge, rail, and/or truck depending upon their origin. Existing waterfront bulkheads, cranes and laydown areas at Beckett Street would be used to support the staging for this Project. At the facility, final turbine assembly including generator mounting and electrical hookups would be performed to minimize work performed offshore. At that point, the turbine manufacturer would lead the final assembly and configuration for the wind turbine generator components to be delivered by vessel to the offshore array field.

The steel turbine towers would be manufactured domestically and transported to the staging area at Beckett Street Marine Terminal via barge, rail, and/or truck. Each tower is approximately 250 feet in length (comprised of bolted segments) and is secured to the foundation by bolting to a transition piece (or flange) at the top of the foundation.

The foundations would be fabricated at a Gulf of Mexico facility and then transported by barge to the staging area at Beckett Street Marine Terminal. Once assembly is completed, the foundations would be loaded onto ABS class ocean deck barges that would carry three jackets per barge. It is anticipated that the two barges would be transported by two tugs directly to the Project site.

The offshore construction activities of the Proposed Project would occur over approximately 7-10 months. To secure the foundation in place, steel pipe pilings 7 feet in diameter would be inserted down through the piling sleeves, then driven to a depth of approximately 140 feet below the seabed using impact hammer methods. Each foundation would also be fitted with a ladder extending from the water surface up to a working deck to allow personnel access from vessels. Electrical power generated by the turbine would be cabled down through the structure to emerge from a J-Tube below the seabed.

Cables would be manufactured in Seymour, Connecticut and transported by rail to a staging pier in Port Elizabeth, New Jersey. The cable reels would be placed on a special cable laying barge and transported to the Project site for installation. See below for details on cable installation.

A floating crane barge or specialized jack-up barge or barge equipped with a high capacity crane pile handling frame and pile driving equipment would perform structure installations (**Figure 4**). The installation vessel would position itself near to each of the turbine installations. The vessel would then jack itself up out of the water to provide a stable platform in which to carry out the installation activities. Offshore experience to date has shown that it normally takes approximately 24 hours in fair weather conditions to position and anchor the installation vessel. Once the installation vessel is in the turbine array field, it would be moved as minimally as possible, but would, out of necessity, move from one turbine location to the next.

Figure 4. Typical heavy jackup vessel used for offshore wind turbine installations

The Proposed Project would be constructed using the following approach which has been successfully employed in Europe:

- All foundations are installed first;
- The submarine cable is installed next and energized to provide electricity from the grid to assist in turbine installation;
- Turbine towers are installed on the foundations;
- The turbines are installed on each tower; and
- Lastly the turbines are commissioned and made operational.

The complete wind turbine structure requires a series of main lifts for full assembly. The foundation center caisson (i.e., a watertight retaining structure) would be driven to the required depth using impact methods. The guide structure would then be lifted onto the caisson and secured. Each of the three pilings would then be lifted into the sleeves on the guide structure and hammered to the required depth below the seabed. The turbine tower would then be lifted and secured onto the foundation. Lastly the turbine components including the nacelle and turbine blades would be lifted to the tower top and installed.

Turbine system installations are anticipated to require 4 to 7 fair weather days to complete. In order to minimize the complexity and duration of offshore operations, components of the turbines would be pre-assembled to the extent possible prior to transportation offshore (refer to discussion above).

2.2.5 Cable Route and Installation

Power output from the turbines would be transmitted via a 33 kV AC submarine cable (export cable) to access the shore. The inter-array transmission cable from each turbine structure would be linked to the export cable that would make landfall at a point in Atlantic City, at the base (southeast terminus) of Tennessee Avenue in Atlantic City. This connection between the inter-array transmission cable and the export cable would occur within the transition piece of one of the turbines which would protectit from damage. The cable would then continue northwest for 1.2 miles underground to the existing Huron Substation, located along Absecon Avenue (**Figure 5**). The path of this underground cable is roughly coincident with the line created by Tennessee Avenue. The submarine transmission cable route was selected after evaluations of alternative routes and landfall locations which included bringing the cable to shore through the Absecon Inlet. The route ultimately selected proved to present the least environmental impacts identified during the permitting process and was most acceptable to the USCG.

Offshore, the submarine export and inter-array cables would be arranged in a single string array. An additional fiber-optic cable bundle, would also be included within the export cable for telecommunication purposes. The overall diameter of the telecommunication cable would be approximately 5 inches. At each turbine location, the power and telecommunication cables would extend down from the turbine within the tower structure, and then emerge through a J-tube just above the seabed where it would be connected to the adjacent turbine.

Jet plowing technology would be used to bury the export and inter-array cables to a target depth of 6 feet below the seabed. Per the Coastal Zone Management Act Rule Regarding Submerged cables at 7:7E-4.20(c)2, a submerged cable shall be buried to a depth of approximately 4 feet both in surf clam areas, and in areas where marine fish are commercially harvested. Fishermen’s proposed depth of 6 feet is approximately 2 feet deeper than required for this Special Area. Further, the occurrence of Hurricane Sandy passing through the Project area during 2012 provided a unique opportunity to measure the impacts of a hurricane force storm on the Project area seabed, in particular at the turbine locations and along the cable routes. As part of the initial Project site assessment a high resolution geophysical survey was performed across the entire area documenting, among other things, the bathymetric features of the site. After the passing of Hurricane Sandy, the high resolution bathymetry survey was repeated to assess the change in bottom topography and to identify any particular areas prone to sediment erosion or accretion. Analysis of the pre- and post-Sandy surveys indicates that only minor erosion or accretion of sediments, less than 1 foot, occurred along the proposed cable route. In no areas along this route would a cable be threatened to exposure.

The export cable would originate at Turbine #3. During this process the installation vessel slowly travels along the planned cable route while towing a weighted sled fitted with a trenching device (plow) and a nozzle which jets water into the bottom to create a narrow trench. The cable is simultaneously fed out from the vessel and laid into the trench. Blades at the back of the sled scrape bottom material over the trench to backfill. The cable would be buried in this manner to approximately 1,800 feet from the shoreline.

Beginning at a distance approximately 1,800 feet from the shoreline, the cable would be routed through a lined conduit installed using Horizontal Directional Drilling (HDD) methods.[2] The installation of this HDD conduit would be performed from the landside. At the base of Tennessee Avenue (approximately 500 feet inland of the high water line), a concrete vault approximately 8 feet by 8 feet by 7 feet would be installed below roadway grade using typical upland excavation equipment. HDD equipment would then drill a 6-inch diameter cable-way 25 feet below the street level, approximately 25 feet underneath the boardwalk and beach, and emerge at the jet plow end point 1,800 feet from shore. While drilling, the cable-way would be lined with polyvinyl chloride (PVC) conduit to prevent collapse and to protect the cable after it has been installed. Soil material removed from the bored hole (approximately 13 cubic yards) would be removed from the site. All construction-related soil and debris would be appropriately disposed of depending upon the characteristics of the material, in accordance with relevant New Jersey Department of Environmental Protection (NJDEP) regulations. Once HDD is completed, the cable would be pulled from the offshore vessel through the conduit to emerge at the shore end vault, where the offshore cable would be connected.

A similar cable to that used offshore, but designed specifically for land applications would be used for the remaining 1.2 mile run below the Tennessee Avenue street level to the Huron substation. Again HDD methods would be used to route the cable 25 feet below street level. This burial depth was selected after a review of existing below grade infrastructure along this route. At 25 feet, the cable would be below all existing infrastructure. Soil material removed from the bored hole (approximately 46 cubic yards) would be removed from the site and properly disposed as described above. At the Huron substation facility, a breaker system, and other minor electrical components specific to the Proposed Project would need to be installed for connection of the export cable and to the power grid.

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[2] HDD is a steerable trenchless method of installing underground pipes, conduits and cables in a shallow arc along a prescribed bore path by using a surface-launched drilling rig, with minimal impact on the surrounding area.

Figure 5. Upland cable route for the Proposed Project.

2.2.6 Operations and Maintenance

Upon completion of the construction activities, FAWC would conduct several weeks of commissioning activities that would entail the testing of the turbines as well as the offshore and onshore transmission systems. The Project would begin operations approximately in October 2017 and continue until the end of the 25-year expected operational life of the facility.

Operation of the turbines would require continuous remote (i.e., shore-based) monitoring and control, scheduled onsite maintenance, and unscheduled responses to faults or damage. Additionally, the management of the maintenance program and reporting requirements would be addressed by the operations team. This work includes, but is not limited to:

- Remote monitoring and supervision of the wind turbines and associated equipment 24 hours a day, 7 days a week using the wind power supervisory control and data acquisition system;
- Initiation of any required corrective action;
- Operation of the Turbine Condition Monitoring (TCM) system;
- Performing diagnostic assessment of data from the TCM;
- Managing the inventory of spare parts, including performing any maintenance of these spare parts;
- Scheduling and logistics planning of maintenance activities; and
- Performing daily communication with the facility operator.

Each turbine would undergo scheduled maintenance and inspection as well as a full annual maintenance program as prescribed by the turbine manufacturer. This work would be performed by personnel qualified by the manufacturer. Additionally, inspections of the underwater structures and seabed would be performed at a minimum of once per year. There is no regulatory agency that oversees these inspections; however, these inspections will meet the requirements of our Certified Verification Agent (CVA). While not required for this project, a third-party CVA is typically required of projects permitted by Bureau of Ocean Energy Management and will be used on this project as an industry standard practice.

As access to the turbines can only be achieved by vessel, sea conditions would dictate when service may be performed. Heavy annual work would be scheduled to occur during summer months when conditions for accessing the turbines are typically suitable (waves less than 3 feet). During winter months, accessibility may be limited for extended periods of time.

Service crews would board a dedicated service vessel based in Atlantic City, New Jersey. Personnel would gain access to the turbines via the ladder system incorporated into each foundation. Tools and light parts would be lifted onto the structure using a small crane system provided on the structure working deck. Annual maintenance for each turbine is expected to require 5 to 8 days of onsite work. Turbines would be returned to normal operation at the end of each service day.

No oils or other waste would be discharged during service events. Appropriate measures would be implemented to provide for containment and collection of hazardous material spills should they occur. It is not expected that any painting would be necessary during the life of the turbines, other than to repair damage. The original coating system on the towers is designed to last the lifetime of the structure.

2.2.7 Decommissioning

While the Project is presently planned for a 25 year operational period, the potential for equipment upgrades and continued operation would be evaluated throughout the Project life. When it is determined that the Project is to be decommissioned, all physical elements of the Project above the mudline would be removed (in some cases to as deep as 15 feet below seabed) and the seafloor would be restored to its original condition. A financial instrument to fund decommissioning activities would be set in place at the start of the Project to ensure that sufficient funds are available for removal of the turbines and support infrastructure.

A comprehensive Post-Construction Monitoring and Work Plan has been developed in parallel with engineering studies and the Project Construction Plan (**Appendix B**). The Post-Construction Monitoring and Work Plan addresses the engineering, environmental, regulatory, and economic elements of the decommissioning task. The plan addresses state requirements presently in place as well as those established by the Bureau of Ocean Energy Management (BOEM) guidelines described in 30 CFR Parts 250.1700 – 1754. An overview of the Decommissioning Plan **(Appendix I)** is provided below.

Decommissioning of the Project would involve the removal of equipment both offshore and onshore and would be performed utilizing similar equipment to that used during the construction process. This equipment may include barges, lift boats, tugs and crew vessels. Deep draft vessels would port at the Beckett Street Terminal in Camden, New Jersey, while smaller crew vessels would operate from Atlantic City. Onshore, trucks, trailers, and cable handing equipment would be used to recover the cable and substation equipment. Removed materials would be refurbished, recycled, or disposed of, as appropriate.

2.2.7.1 Offshore Equipment Removal

Removal of the offshore equipment would consist of the following tasks:

- Removal of the wind turbines;
- Removal of towers and foundations;
- Removal of inter-array and export cables; and
- Site clearance survey.

The removal processes would be performed with full consideration of environmental and safety compliance. Federal and state permits would be in place as required prior to initiating decommissioning. During decommissioning, safety exclusion zones would be established and marked with buoys and navigational aids to protect the workforce and vessel traffic. FACW would ensure that any subsea obstacles would be adequately marked until they are made safe or removed.

Turbine Equipment

Removal of the turbine equipment would essentially be the reverse of the installation. Using a barge supported heavy lift crane, each rotor and nacelle would be lowered to a transport barge and secured for transit to port. Power cables would be removed from the tower and at the sea bed. The steel turbine tower would be removed as one unit above the transition joint at water level.

Foundations

Each tower foundation is comprised of three driven pilings, a center caisson and a guide structure. The guide structure would first be removed and loaded onto a barge for recycling. Each of the pilings and the caisson would be cut 15 feet below the seabed and removed. The remaining piling structures (below -15 feet) would be left in place.

Cabling

Because full removal off all buried cable would cause disturbance to the established sea bed, power cables at each turbine location would be excavated to the 6 foot burial depth, cut and removed. All cabling at or below the 6-foot depth would be left in place undisturbed.

Site Clearance

Upon completion of structural decommissioning, a site clearance survey would be performed to ensure that no debris remains within the Project area, and to document the physical condition of the seabed. Similar to the geophysical survey performed pre-construction, the clearance survey would employ side scan sonar for imaging the seabed, a magnetometer to detect ferrous materials, and depth mapping systems. Any objects detected would be investigated and removed as appropriate. Demonstration of clearance would be provided to the appropriate agencies.

2.2.7.2 Onshore Equipment Removal

Removal of the onshore equipment would consist of the following tasks:

- Removal of sea-to-shore transition cable;
- Abandonment of sea-to-shore directionally drilled conduit;
- Abandonment of the onshore cable vault;
- Removal of land cable; and
- Removal of substation equipment.

Transition Cable

After removal of the offshore equipment, the remaining power transmission cable would be pulled back through its HDD conduit to the vault at the base of Tennessee Avenue from where it would be removed for recycling. The 6-inch conduit would be left in place, 25 feet below the boardwalk and approximately 25 feet below the beach, and extending offshore to the former transition point.

Vault

All equipment would be removed and the vault would be abandoned in accordance with Atlantic City, New Jersey regulations or, at the discretion of the city, the vault would be removed and the excavated site backfilled.

Land Cable

The land based cable extending from the vault to the Huron substation would be removed from its conduit by pulling from the substation end. The cable would be trucked from the location and recycled. The 6-inch buried conduit (approximately 25 feet below grade) would be capped and left in place for future use by the city or other projects.

Substation Equipment

Switchboxes and other electrical equipment at the substation will be removed in accordance with requirements set by Atlantic County Electric. Any other ancillary equipment would either be removed or left in place as preferred by Atlantic County Electric.

2.3 No-Action Alternative

Under the No-Action Alternative, DOE would not authorize the expenditure of federal funds for FACW to design, construct, operate, maintain, and eventually decommission the windfarm. Any potential beneficial or adverse effects to the physical, natural, or socioeconomic resources would not be realized.

2.4 Alternatives Considered During Initial Planning

During initial Project planning and coordination, a variety of information was compiled (i.e., wind resources, bathymetry, substation locations, shipping channels, sensitive habitat for wildlife and fisheries, airplane routes, etc.) and multiple options for offshore locations were evaluated. In addition, Fishermen’s Energy reviewed the information available in the *New Jersey Offshore Wind Energy: Feasibility Study* (Atlantic Renewable Energy Corporation and AWS Scientific, Inc. 2004). As a result the offshore location of FACW, the Project site was identified as the optimal location and no further detailed analysis of alternative offshore locations was completed.

An alternative for the submarine transmission cable route was considered, which involved routing the cable through Absecon Inlet and Clam Creek, making landfall through an existing sheet-pile wall, and continuing underground via HDD to the Huron Substation. This alternative was considered to be feasible during the initial Project planning stages because landfall at a sheet-pile wall seemed to avoid many of the natural resources associated with a naturalized shoreline, and the area on the landward side of the sheet-pile wall was already disturbed and developed. However, shellfish resources within Absecon Inlet, particularly within Clam Creek, would have been impacted by this alternative. Furthermore, during the USACE permitting process, the USCG was concerned that a buried cable within the Abescon Inlet could potentially interfere with maintenance dredging and vessel anchoring. Therefore, this alternative was eliminated from consideration.

Additional substations for interconnection to the Pennsylvania – New Jersey – Maryland Interconnection (PJM) transmission system were also considered. Potential substations that appeared to be viable points of interconnection based on the capacity of the circuits at the substation and the amount of power flow in the model and the associated cable route for interconnection were analyzed. The selected substation represents the cable route that best satisfies the selection criteria and minimizes potential impacts to aquatic resources, water quality, and navigation. These alternative substation locations and cable routes were eliminated from consideration.

2.5 Permitting Summary

Prior to DOE's involvement with the Proposed Project, FACW coordinated with, and obtained authorizations and input from, various federal, state, and local agencies, primarily associated with various permitting processes for the FACW. This section summarizes public input opportunities associated with the USACE and NJDEP permitting processes; and the USACE permitting and NEPA process and federal agency consultations completed as part of the USACE permitting process.

2.5.1 Public Input

There have been two opportunities for public input on the Proposed Project to date and one public opinion poll was completed.

2.5.1.1 Public Opinion Poll

A public opinion poll of people on the Atlantic City boardwalk regarding an offshore wind farm was completed in July 2009 (Hughes Center 2009). The results indicated that most respondents (66 percent) thought offshore wind turbines would have a positive impact on Atlantic City and the local environment. Most visitors (77 percent) indicated that offshore wind turbines would either not effect whether they visited again or even increase their likelihood (19 percent) of future visits.

2.5.1.2 USACE Public Notice

A Public Notice (PN) was issued on August 27, 2010 as part of USACE permitting (**Section 2.5.2**) with public comment extending for 30 days. In response to the PN, USACE received seven comment letters, three from federal agencies, which are summarized in **Section 2.5.2**, and four from the following entities:

- Evergreen Environmental dated August 26, 2010 which related to the need for mitigation pursuant to the Clean Water Act 404 program;
- American Waterways Operators dated September 20, 2010 which was a letter in support of the Proposed Project;
- Clean Ocean Action dated October 1, 2010 which provided support for the Proposed Project, but requested involvement in the planning for monitoring and biological assessment activities; and
- Dock Builders Union dated November 1, 2010 which provided support for the Proposed Project.

All comments received from the USACE PN were considered by the USACE in their evaluation of the Individual Permit application for the installation of the offshore wind turbines.

Based on those comments, revisions to figures, revisions to the application, additional data and clarifications were requested. No changes, however, in the location of the Proposed Project or general approaches to the technical aspects of the Project design were requested as a result of the Public Notice comments.

The Project was modified since issuance of the DA permit, which requires the USACE to review the changes and determine if a permit modification should be issued. The USACE issued a new public notice for the proposed permit modification on February 26, 2015.

2.5.1.3 NJDEP Public Notice

NJDEP has a separate permitting process from the federal permitting process. A NJDEP Multiple Permit application was submitted by FACW on March 4, 2010 for the installation of the offshore wind turbines. There was a statutory 30-day public comment period from acceptance of the permit as administratively complete by NJDEP, which ended on July 28, 2010. No comments were received during this period.

2.5.2 USACE Permitting

The USACE has regulatory and permitting authority under Section 404 of the *Clean Water Act* and Section 10 of the *Rivers and Harbors Act of 1899* pertaining to discharges of dredged or fill material into waters of the US and authorization of structures or work in or affecting navigable waters of the US. Section 404 is related to fill waterward of the high tide line and Section 10 is for work waterward of mean high water. Based on this authority, the USACE was the lead agency in the federal permitting process. The USACE conducted three pre-application meetings with FACW which included representatives of other federal and state agencies, including USFWS, NMFS, USCG, and the NJDEP. The purpose of these meetings was to obtain input from the agencies on the components of the permit application and the preliminary concerns of the various agencies jurisdiction over the Project.

FACW submitted an application for an USACE Individual Permit on April 5, 2010 for the installation of the offshore wind turbines. FACW submitted an application to modify the existing USACE Individual Permit in December 2014.

2.5.2.1 USACE NEPA

USACE prepared an EA compliant with NEPA and USACE NEPA regulations for FACW’s Individual Permit Application. Upon completion of the NEPA process and USACE public interest review, USACE issued Individual Permit number CENAP-OP-R-2008-0777-39 on June 14, 2012 to FACW (**Appendix E**) authorizing the installation of the offshore wind turbines.

2.5.2.2 USACE Agency Consultations

During the USACE NEPA process, coordination and consultation for permitting of the Proposed Project were completed with other federal agencies. Comments were received from USFWS, NMFS, USCG, and USEPA following the review of the actual permit application and supporting documentation. These comments led to the development of additional information supporting the permit application, including site specific biological and geophysical information about the location. However, the only comment that resulted in a modification to the layout of the Project was a comment internal to the USACE which indicated that the underwater cable connecting the wind farm to the shore was proposed to pass through a sand bar that was identified by the USACE as borrow material for several beach replenishment projects. As a result, the connection cable was shifted from Turbine #4 to Turbine #3. The following sections summarize discussions, comments and applicant-committed measures and mitigation for each federal agency consulted.

National Marine Fisheries Service

The NMFS first provided comments on the permitting of the Proposed Project in a letter dated October 20, 2010 in response to the USACE PN. The letter identified the need for an Essential Fish Habitat (EFH) assessment, and identified several data deficiencies related to sediment characteristics and benthic resources, bathymetry, ichthyoplankton, fisheries and fishing, and wave and current data. The letter also identified potential endangered and threatened species and marine mammals that would need to be addressed during the permitting process.

On November 10, 2010 FACW met in Trenton, New Jersey with representatives of the NMFS Sandy Hook field office to discuss the data needs for completion of an EFH assessment, including the collection of site specific, benthic invertebrate information. The outcome of the meeting was the submission of a letter by FACW on November 12, 2010 requesting approval from the USACE of the list of species to be evaluated in the EFH assessment and the submission of a second letter on November 15, 2010 requesting approval of the proposed outline of the EFH assessment.

A benthic invertebrate report based on the review of literature and historic sampling in the area was provided to the USACE and NMFS on January 3, 2011. The EFH assessment was submitted on February 17, 2011. Due to the timeframe for the evaluation of site specific, benthic macroinvertebrate data, an addendum to the EFH report providing the site specific information was submitted on March 28, 2011. Limited comments were received from NMFS on March 29, 2011. A final EFH assessment was submitted to the USACE and NMFS on May 3, 2011. The NMFS concurred with the EFH assessment in correspondence dated June 28, 2011.

The EFH assessment found that implementation of the Proposed Project would result in a loss of soft substrate but an increase in hard substrate, thus increasing habitat diversity. Therefore, underwater sound emanating from the Proposed Project is unlikely to have harmful effects on the noise environment of EFH species. While the EFH assessment found the construction and decommissioning of the Project would result in temporary disturbance of EFH, the study concluded that that the Project will have no more than minimal impacts to species and life stages that have pelagic or demersal EFH habitat in the Project area. Consequently, no mitigation measures related to EFH were recommended for the Proposed Project by NMFS.

Regarding species protected by the Marine Mammal Protection Act (MMPA), the USACE relied on discussions between FACW and the NMFS Gloucester, Massachusetts and Silver Spring, Maryland offices as part of the development of the MMPA Incidental Harassment Authorization (IHA) to resolve concerns with marine mammals and sea turtles. FACW provided a revised request for Letter of Concurrence (LOC) Application on March 30, 2010 for pre-construction geotechnical and geophysical surveys of the Project area, and for the deployment of a buoy outfitted with meteorological survey equipment. The LOC was issued by NMFS on April 21, 2010. A request for IHA for construction of the Project, including pile-driving required for the six turbine foundations, was submitted on August 26, 2011 and approved by NMFS on June 27, 2012. Special conditions 15 through 26 of the Individual Permit outline requirements for the protection of MMPA species during construction.

The NMFS issued a letter on April 11, 2012 in which they determined that with the inclusion of special conditions in an issued Department of the Army permit, the Project is not likely to adversely affect federally listed threatened and endangered species in and around the Project area.

US Fish and Wildlife Service

Initial comments from USFWS received in March 2010 resulted in FACW developing a Pre-Construction Monitoring Work Plan which was submitted to USFWS in April 2010. The monitoring began in May 2010 which included the study of the presence of birds, marine mammals, and sea turtles in the vicinity of the Project area.

Several letters were received from USFWS during the Endangered Species Act (ESA) consultation process. The first letter from the USFWS was submitted to the USACE on September 22, 2010. The letter focused on USFWS concerns based on their knowledge of the Proposed Project at that time. The primary concerns related to two threatened and/or endangered avian species: piping plover (*Charadrius melodus*) and roseate tern (*Sterna dougallii*); and one listed plant species: seabeach amaranth (*Amaranthus pumilus*). In addition, one candidate avian species: red knot (*Calidris canutus rufa*) was considered. Subsequently, the red knot became listed as a threatened species on January 12, 2015.

Several meetings with USACE, USFWS, and FACW were conducted beginning on October 29, 2010. The initial discussion resulted in the refinement of the 1-year pre-construction study described above. An Avian Risk Assessment was submitted to USACE and USFWS on April 12, 2011 summarizing the realistic risks to birds, including any threatened and/or endangered avian species from the wind turbines.

On October 20, 2011, the USFWS submitted correspondence to the USACE recommending the preparation of a Biological Assessment (BA) pursuant to the Endangered Species Act for the three listed threatened and endangered species and one candidate species identified previously. A meeting was held with USACE and USFWS on December 19, 2011 to discuss the contents of the BA. A final BA was submitted to the USACE and the USFWS on January 20, 2012. In letter on February 24, 2012 to the USACE, the USFWS indicated that there were omissions in the BA, but did not recommend extensive revisions. Instead, the USFWS asked for a letter providing additional information to supplement the BA. On April 11, 2012, the USACE provided that information to the USFWS in a letter. In that same correspondence, the USACE concluded that the Project was not likely to adversely affect any threatened, endangered, or candidate species. The USFWS concurred with the determination that the Project was not likely to adversely affect any listed species in a letter to the USACE dated April 26, 2012. This concluded the Endangered Species act consultation with USFWS for the permitting of the Proposed Project.

Special conditions 31, 32, and 33 of the USACE Individual Permit outlined requirements for protection of the three avian and one plant species listed as federally threatened or endangered from wind farm operations. One of the requirements from the USFWS was the development of a Post-Construction Work Plan and Post-Construction Monitoring Plan, which was submitted to the USACE and the USFWS on March 23, 2012.

US Environmental Protection Agency

The USEPA provided comments on the USACE PN on October 20, 2010. These comments were focused on the need for preparing a conformity analysis pursuant to the Clean Air Act 1990 Amendments. A Conformity Analysis by FACW was forwarded to the USACE for transmittal to the USEPA on April 21, 2011. The USEPA provided three pages of comments on the analysis in correspondence dated June 23, 2011. A revised Conformity Analysis addressing all of the comments of the USEPA was finalized and submitted by FACW to the USACE for transmittal to the USEPA on July 19, 2011. On September 28, 2012, a conference call was held with representatives of the USACE and USEPA to finalize additional comments on the Conformity Analysis. A final Conformity Analysis was submitted to the USACE and USEPA on October 10, 2011.

No special conditions were attached to the Individual Permit based on the coordination with the USEPA.

US Coast Guard

The USCG provided comments on the USACE PN on October 26, 2010. These comments were primarily focused on the coloration and markings required for the turbines in accordance with USCG regulations, and the need for a land-based control center that would be operated 24 hours, 7 days a week to monitor the performance of the turbines and any emergency response actions should they be necessary.

Based on the comments from the USCG, the turbine detail drawings were modified to ensure that they conformed to the USCG requirements. Special condition 30 of the USACE Individual Permit requires FACW to maintain the control center operations for the Project 24 hours a day, 7 days a week.

State Historic Preservation Office (SHPO)

On June 9, 2010, the USACE District Cultural Resources specialists provided comments to FACW regarding the potential for the Project to impact cultural resources, including shipwrecks, in the vicinity of the proposed wind farm. This determination was made per the requirements presented at 33 CFR 325 **Appendix C**. USACE directed FACW to complete a Phase 1 underwater survey of the area where the turbines would be installed and the various cable runs would be placed.

Based on that request, a Scope of Work (SOW) for Marine Geophysical and Archeological Surveys for the wind farm site was prepared and submitted to the USACE for review and comment. The final SOW was submitted to the USACE on October 7, 2010.

The geophysical and geotechnical activities that were required in support of the Phase 1 were conducted in and around the wind farm and cable areas between December 2010 and February 2011. The final report from the Phase 1 was submitted on March 18, 2011. The report was accepted without comment by the USACE. The report stated that there was no evidence for the occurrence of submerged landforms with the potential to contain Pre-Contact period Native American archaeological deposits. Additionally the report recommended that no additional archaeological survey or consideration of archaeological resources is necessary within the area of potential affect. The New Jersey SHPO concurred with this assessment in a letter dated May 17, 2011 and indicated that if additional submerged archaeological resources are discovered consultation should be re-initiated pursuant to 36 CFR Part 800.13. Additionally, General Condition 4 of the USACE Individual Permit notes that the discovery of any previously unknown historic or archeological remains during construction requires immediate notification of the USACE.

2.5.3 NJDEP Permitting

The NJDEP controls development in the coastal areas of New Jersey through a complex, interwoven set of regulations for coastal zone management (New Jersey Administrative Code [N.J.A.C.] 7:7). In the Atlantic City area, there are three permits that potentially apply to offshore developments: the Coastal Area Facilities Review Act (CAFRA), the Coastal Wetlands Act, and the Waterfront Development Law. Under CAFRA, the state regulates any development within areas identified by CAFRA, which includes any and all development within Atlantic City. Under the Coastal Wetlands Act, the state regulates draining, dredging, excavation or deposition of material in wetlands that have been mapped or delineated pursuant to the Wetlands Act of 1970. As there were no mapped or delineated wetlands associated with the Project area, this rule did not apply. Under the Waterfront Development Act, the state regulates filling, dredging or the placement of structures, pilings and other obstructions in any tidal waterway below the mean high water line. For the Project, the CAFRA rules applied to all upland work including the underground cable and the transition box from underwater to underground cable, while the Waterfront Development Permit applied to all in-water work.

Under the Tidelands Laws, the State technically owns all lands that are either currently or historically flowed by the mean high tide of a natural waterway. In order to place the FACW turbines and cables below the mean high water, permission to place those structures must be obtained through either obtaining a Tidelands License (N.J.S.A. 12:3) or a grant.

The CAFRA and Waterfront Development permits are obtained through a document called a Multiple Permit Application. The application contents are specified by the NJDEP, and include a comprehensive set of drawings and figures, as well as the documentation of potential impacts through the completion of a document called the Compliance Statement. The Multiple Permit Application also includes the requirements needed to comply with the Clean Water Act 401(c) rules.

The Tidelands application requirements are outlined by the Tidelands Resource Council and include a completely different site of figures and drawings. The grants and licenses are more typical of real estate arrangements and are based on agreements for annual payments over a certain period of time.

2.5.3.1 Pre-Application Activities

As part of the NJDEP permitting processes, FACW conducted several pre-application coordination meetings. These are summarized below.

- A June 18, 2009 Pre-Application Meeting with the NJDEP Division of Land Use Regulation (DLUR) staff at the NJDEP offices in Trenton, New Jersey.
- A July 7, 2009 meeting with NJDEP Acting Commissioner, Acting Chief, DLUR, Director, NJDEP Office of Policy, Manager, NJDEP Coastal Management, Manager, NJDEP Office of Science, Senator Steve Sweeney (New Jersey Senate), and others at the NJDEP offices in Trenton, New Jersey.
- A December 9, 2009 Pre-Application Meeting with NJDEP DLUR, NJDEP Tidelands, and NJDEP Green Acres office.
- A January 13, 2010 Joint Permit Planning meeting with the USACE, USFWS, NMFS and various offices of the NJDEP.
- A February 26, 2010 meeting with the NJDEP Commissioner, 2 assistant Commissioners, the Governor’s Chief of Staff and Director, NJDEP Office of Policy.

As part of the NJDEP permit, FACW has received the Waterfront Development Permit, 401 Water Quality Certificate, Coastal Area Facilities Review Act Permit and Tideland License #0102-09-0024.2; there are no additional permits or licenses required from NJDEP. The NJDEP Multiple Permit was issued on March 29, 2011. Subsequently, due to proposed project modifications a permit modification package for the Waterfront Development Permit and Water Quality Certificate was submitted to the NJDEP for review. No modifications were proposed upland of the Mean High Water Line; therefore, no modification to the CAFRA Individual Permit was necessary. The NJDEP approved the proposed project changes and approved the request for a modification of the Waterfront Development Permit and Water Quality Certificate via letter dated July 1, 2015 (Appendix F). All terms and conditions of the original approval remain in effect and the July 1, 2015 letter only extended the original permit expiration date to June 30, 2016.

2.5.4 Permits and Authorizations Issued

Table 2-2 summarizes the various permits, licenses, and authorizations received to date by FACW for the Proposed Project. **Section 2.6** summarizes measures that FACW has committed to as part of these permits and authorizations.

Table 2-2. Municipal, State and Federal Permits and Authorizations

Permit	Agency	Project Element	Status
Marine Mammal Protection Act (MMPA) Letter of Concurrence (LOC)	NMFS	Pre-construction geotechnical survey and meteorological buoy	LOC received Dated April 21, 2010
Individual Permit	USACE	Project construction	Permit received Dated June 8, 2012
Waterfront Development Permit/CZM Consistency Determination	NJDEP	Project construction	Permit modification received Dated July 1, 2015
401 Water Quality Certificate	NJDEP	Project construction	Permit modification received Dated July 1, 2015
Coastal Area Facilities Review Act (CAFRA) Permit	NJDEP	Project construction	Permit received Dated March 29, 2011
Tideland License #0102-09-0024.2	NJDEP Bureau of Tidelands Management	Project construction and operation	License received Dated May 4, 2011
MMPA Incidental Harassment Authorization (IHA)	NMFS	Project construction	Permit application submitted on August 26, 2011; approval June 27, 2012 (requires renewal)
FAA Clearance	FAA	Project operation	Clearance received Dated November 4, 2015

2.6 Applicant-Committed Measures

As discussed in **Section 1.4**, FACW submitted a permit modification package to USACE in December 2014. Since modification of the USACE permit requires additional NEPA review and re-initiation of federal consultations, DOE invited the USACE to become a cooperating agency in the development of the DOE EA. In addition, to streamline processes and prevent duplication of efforts both agencies agreed to jointly re-initiate consultations for the Proposed Project. In addition to the USACE permit modification, a NJDEP permit modification is also being processed. The NJDEP issued their permit modification on July 1, 2015 and the only modification was to the expiration date of the permit. The permit modifications were required due to turbine and foundation size and design modifications; the overall footprint and effects of the Proposed Project have not changed.

FACW has made a number of commitments, listed below by resource area, to mitigate potential impacts that were identified during the development and permitting of the wind farm and preparation of the EA. These commitments would be incorporated and binding through the DOE financial assistance award. For purposes of this EA, the term mitigation measure is broadly defined. The measures below were not necessarily included to decrease the level of impact below significant (i.e., the impacts may have been less than significant with or without the measures), but the measures would be required as a condition of the

DOE financial assistance award to further reduce the likelihood of impacts and to ensure the Project is carried out in an environmentally responsible manner.

2.6.1 Ocean Use/Marine Transport

Special Condition 11 of the USACE Individual Permit and Special Condition 12 of the NJDEP Permit require FACW to notify under appropriate protocol all applicable agencies (e.g., USCG, USACE, etc.) and mariners that a construction vessel will be moored or traveling within navigable channels prior to construction. All appropriate safety protocols will be employed to preclude collisions.

Special Condition 13 of the NJDEP Permit requires FACW to follow any temporary navigation restrictions imposed by USCG during construction activities. Special Condition 14 of the NJDEP Permit requires FACW to notify the appropriate authorities to include the wind turbines on navigation charts.

Special Conditions 6 and 9 of the USACE Individual Permit require markings and lighting of turbines in compliance with FAA and USCG requirements. The turbines would be marked and/or lighted in accordance with FAA Advisory circular 70/7460-1 K Change 2, *Obstruction Marking and Lighting*, as well as in accordance with USCG requirements. This includes bright white or light off-white paint for the tower and turbines, and a specific yellow color as referenced to the Munsell Chart for the foundation structure, which is most often found on offshore wind turbines. These colors have been shown to be the most effective daytime early warning device, and if used, no lights are required during the daytime. Nighttime wind turbine obstruction lighting would consist of the preferred FAA L-864 aviation red-colored flashing lights (20-40 flashes per minute). Special Condition 29 of the USACE Individual Permit requires maintenance of all required lighting and repair within 30 days.

In addition, the turbines would be equipped with all of the required navigational safety equipment, including (but not limited to) a fog detector, foghorn, and radar reflector, in order to facilitate the safe passage of boats and other marine traffic.

Special Conditions 10 and 30 of the USACE Individual Permit require FACW to maintain a land-based control center that would be operated 24 hours a day, 7 days a week to monitor the performance of the turbines and any emergency response actions should they be necessary.

Special Condition 11 of the NJDEP Permit requires FACW to follow the approved Decommissioning Plan.

2.6.2 Water Resources

The use of jetting and HDD technology for the installation of the submarine and upland portions of the cable were chosen over mechanical dredging in order to minimize the suspension of sediment by avoiding the need to remove and handle sediments along the entire cable route. They are considered the best methods to achieve the desired burial depth with minimal environmental impacts to water quality and sensitive aquatic natural resources.

All marine construction and maintenance contractors for the Proposed Project would have an Oil Spill Response Plan (OSRP) developed specifically for the Proposed Project, with a Response Provider identified and engaged to immediately deliver any required services.

Vessels used in the construction, monitoring, and decommissioning of this Proposed Project would use established shipping ports and channels with depths sufficient for the safe navigation of boat traffic, minimizing the likelihood of a vessel accident. All appropriate safety protocols would be employed to preclude collisions or accidental spills and leaks.

Special Condition 34 of the NJDEP Permit requires disposal of excavated or dredged materials outside of sensitive areas associated with water resources (e.g., floodplains, wetlands) and in a manner that does not affect existing flow of water.

2.6.3 Marine Mammals and Sea Turtles

Special Conditions 15 through 28 of the USACE Individual Permit outline requirements for the protection of marine mammals and sea turtles. FACW will adhere to permit stipulations addressing the potential for harassment or harm to marine mammals and sea turtles during construction which include but are not limited to:

- Compliance with the JOINT Notice to Lessees and Operators (NTL) No. 2012-G02 (BOEM 2012b) that specifies mitigation measures and observer requirements for seismic surveys (Special Condition 15)
- Maintaining a marine mammal and sea turtle exclusion zone of 4,100 feet around any pile driving activity (Special Condition 16, 18)
- Using a soft start (i.e., reduced initial intensity of pile driving and other construction activities) when beginning work (Special Condition 17)
- Pressure level monitoring to ensure that noise limits within the exclusion zone are not exceeded (Special Condition 15)
- Use of qualified NMFS-approved observers to maintain a watch at all times when pile driving is occurring (Special Condition 20)
- Completing marine mammal and sea turtle reporting requirements to USACE and NMFS (Special Conditions 21, 26, 28)
- Developing protocol and training for vessel captains and crews and aircraft pilots associated with the Proposed Project to ensure no harassment of marine mammals or sea turtles (Special Conditions 22-24)
- All work vessels will travel at slow speeds (i.e., 10 knots or less) from November 1 through July 31 within the Project area and travel at idle speeds in shallow waters (Special Condition 25)
- Post-construction, FACW will also:
  - Comply with monitoring requirements as approved by NMFS and documented in Post-Construction Work Plan and Post Construction Monitoring Plan (**Appendix B**), which includes a 2-year Post-Construction Monitoring Program (Special Condition 27, see more in **Section 2.6.6** and **Appendix B**)

  - Monitor underwater noise generated by the operating turbines using passive acoustic devices installed in parallel with similar devices for detecting post-construction marine mammal presence
  - FACW will provide the results of all monitoring to the appropriate agencies to supplement impact knowledge

2.6.4 Birds and Bats

Special Condition 31 of the USACE Individual Permit and Special Conditions 25 of the NJDEP Permit require curtailment or ceasing operations of all turbines to minimize potential impacts to birds and bats. The USACE Individual Permit specifies curtailment (specifically ceasing operation) between March 15 and June 15 and between August 1 and October 31, if the visibility in the Project area is less than 0.6 miles and/or overcast sky at or below the top of the turbine rotor sweep. If the forecast for the Project area does not anticipate these weather conditions, curtailment would still occur if the turbine sensors detect poor visibility for more than 2 consecutive hours or if the forecast for the Project area does anticipate the reference visibility conditions for a period greater than 6 hours and turbine sensors detect poor visibility. However, the USACE Individual Permit further specifies that turbines can be restarted after 2 consecutive hours of good visibility.

The NJDEP Permit specifies curtailment during peak spring and fall migration periods (corresponding to the USACE Individual Permit dates). Per the NJDEP Permit conditions, curtailment shall not exceed 360 hours in a calendar year per turbine, even if physical conditions for curtailment exceed those hours; however the USACE Individual Permit does not contain that threshold. Minimum wind speeds may factor into decisions about curtailment. Curtailment may be required due to low wind speeds, low altitude cloud cover, strong storms or approaching weather fronts during migratory periods.

Special Condition 26 of the NJDEP Permit requires NJDEP to provide any operational limitations by March 15 of the first year of operation for spring migration and July 15 of the first year of operation for the fall migration. These limitations will remain in effect unless NJDEP notifies FACW that changes are required. Special Condition 27 of the NJDEP Permit requires FACW to maintain records of all curtailment-related shut downs and start ups and provide them if requested.

Special Condition 29 of the USACE Individual Permit and Special Condition 24 of the NJDEP Permit require that no permanent, continuous exterior lighting be placed on the turbines except those required by USCG and FAA.

Special Condition 33 of the USACE Individual Permit and Special Condition 23 of the NJDEP Permit require Post-Construction Monitoring (see **Section 2.6.6**). A Post-Construction Work Plan and Post-Construction Monitoring Plan was submitted to the USACE and the USFWS on March 23, 2012.

2.6.5 Other Biological Resources

The beach and dune area will be protected by using HDD to install the export cable from the wind farm. No other sensitive areas or wetlands will be impacted by construction. Disturbance to any upland vegetation during construction activities will be mitigated through revegetation of the disturbed areas, most likely through re-seeding.

Special Condition 32 of the USACE Individual Permit requires that a seabeach amaranth survey be completed before any disturbance of the beach/dune areas east of Tennessee Avenue and landward of mean high water between May 15 and November 30. Survey results will be sent to USACE and USFWS and work will not proceed until written approval is received. This is for maintenance work only, original installation to be done by HDD.

The use of jet plow technology and HDD to bury the cable minimizes potential impacts to sediment-related biological resources, such as wetlands and fish and shellfish on the sea floor.

2.6.6 Post-Construction Work and Post-Construction Monitoring

Post-construction monitoring is required by both the USACE Individual Permit and NJDEP Permit. It will be conducted to assess the impacts of the Project relative to baseline biological data collected during the extensive Pre-Construction Monitoring Program which included assessments of birds, bats, marine mammals, fish, turtles and benthic species (AMEC Environment & Infrastructure, Inc. [AMEC] 2009 and 2011; GMI and Curry & Kerlinger 2011; Normandeau Associates, Inc. [Normandeau] 2011a, 2011b). Radar data is also included in all monitoring as required by Special Condition 23 of the NJDEP Permit.

A Post-Construction Work Plan and Post-Construction Monitoring Plan (**Appendix B**) was submitted pursuant to the conditions of the NJDEP and USACE permits. The purpose of this study is to provide geographical information system (GIS), as well as spatial and temporal data analysis for various species potentially utilizing the Project area for a period of 2 years. The scope of the study includes data collection for the presence/absence, distribution, abundance and migratory patterns of avian, bat, marine mammal, sea turtle, and other marine species in the FACW Project area. The Post-Construction Work Plan and Post-Construction Monitoring Plan includes all study components in the Pre-Construction Monitoring Program initiated by FACW in 2010 and a study component for monitoring avian and bat collision mortality during turbine operation.

Additionally a Post-Construction Monitoring Plan was submitted to describe the efforts FACW will undertake to monitor scour and the presence of fish at the base of each turbine (**Appendix B**). Plans for the periodic inspection and analysis of the benthic communities and the sediments along the cable routes are also presented in this plan.

Six month interim reports would be completed during the 2 year post-construction monitoring period, with a final summary report provided to the NJDEP and the USACE at the completion of the 2 years of operation. An annual meeting will also be held between FACW and the USACE and other agencies to review the Post-Construction Work Plan and Post-Construction Monitoring Plan and the utility of conservation measures.

2.6.7 Air Quality

Special Conditions 28-33 of the NJDEP Permit stipulate a number of requirements associated with protecting air quality and reducing emissions. These conditions require that:

- Non-road construction equipment complies with 3 minute idling limit, unless an existing exemption applies (Special Condition 28)
- Diesel non-road construction equipment uses ultra-low sulfur fuel (Special Condition 29)
- Diesel non-road construction equipment greater than 100 horsepower meets USEPA Tier 4 non-road emissions standards or meets USEPA Tier 2 non-road emissions standards plus best available emission control that is technologically feasible (Special Condition 30)
- Measures will be used to minimize emissions from tugs, barges and other marine vessels during construction (Special Condition 31)
- FACW will provide bi-annual reports to NJDEP (Special Condition 32) and abide by Federal General Conformity regulations (Special Condition 33)

Fishermen’s construction contractors would also abide by New Jersey Administrative Code (N.J.A.C.) 7:27-14 and N.J.A.C. 7:27-15 as well as all other local, state, and federal ordinances regarding construction equipment. Additionally, Fishermen’s construction contractors would abide by USEPA Tier 4 non-road emission standards or the best available emission control technology that is technologically feasible, as well as all other local, state and federal ordinances regarding construction equipment.

2.6.8 Cultural Resources

Special Conditions 16, 18-22 of the NJDEP Permit stipulate a number of requirements associated with cultural resources. As required by Special Condition 16 and 18 of the NJDEP Permit, extensive archeological and cultural resource surveys have been performed at the Project area and reviewed by the New Jersey State Historical Preservation Office (SHPO) and NJDEP. Special Condition 16-18 of NJDEP Permit require FACW to provide final layout of cable routings and foundation locations and that any changes in these that are outside the original cultural resources investigations necessitate new surveys and coordination with NJDEP.

While no evidence of items of archeological or cultural significance were found (Robinson 2011; Basilik and Ruth 2011), FACW will continue to monitor for artifacts and advise the appropriate agencies of any findings during construction. General Condition 3 and Special Condition 8 of the USACE Individual Permit require that the discovery of any previously unknown historic or archeological remains during construction results in immediate notification of the USACE.

2.6.9 Socioeconomics

Fishermen’s construction contractors would use designated truck routes that are designed to minimize impacts on residential areas and sensitive receptors such as hospitals, schools, daycare facilities, senior citizen housing, and convalescent facilities to the extent possible.

SECTION 3
AFFECTED ENVIRONMENT AND ENVIRONMENTAL IMPACTS

This section describes the existing environmental resources in association with the entire Project area, defined here as the area encompassing both the wind turbines, including the perimeter around the turbine, extending approximately 200 feet in each direction, and submarine transmission cable, including from where the submarine cable makes landfall and continues to the Huron Substation. It also examines in detail the potential environmental consequences of the Proposed Project and the No-Action Alternative on the environmental resource areas. Potential environmental consequences are analyzed separately for the (1) construction; (2) operations and maintenance; and (3) decommissioning phases of the Proposed Project.

Impacts are described in terms of their type (adverse or beneficial), duration (short- or long-term), and intensity. The definitions for impact intensity thresholds used in this document are as follows:

- ***Negligible***. Impacts on the resource, although anticipated, would be difficult to observe and are not measurable.
- ***Minor***. Impacts on the resources would be detectible upon close scrutiny or would result in small but measurable changes to the resource.
- ***Moderate***. Impacts on the resource would be easily observed and measurable, but would be localized or short-term (equal to or less than 2 years).
- ***Major***. Impacts on the resource would be easily observed and measurable, widespread, and long-term (i.e., more than 2 years).

In addition to these impact threshold definitions under NEPA, there are additional effects determinations definitions that apply specifically for ESA and for Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act). ESA (Section 7 Consultations) effects determinations can be in one of the three following categories for any federally listed species.

- ***No effect.*** Federally listed species or critical habitat will not be affected, directly or indirectly.
- ***May affect, but is not likely to adversely affect***. All effects on federally listed species are beneficial, insignificant, or discountable.
- ***May affect, and is likely to adversely affect***. An adverse effect to listed species may occur as a direct or indirect result of the proposed action and the effect is not: discountable, insignificant, or beneficial.

Magnuson-Stevens Act. ***Adverse effect*** means any impact that reduces quality and/or quantity of EFH. EFH effects determinations can be in one of the three following categories.

- None or minimal.
- More than minimal but less than substantial.
- Substantial.

Per the Council on Environmental Quality (CEQ) guidelines, resources that are anticipated to experience either no impact or negligible environmental impact under implementation of the Proposed Project are not examined in detail, but described below in **Section 3.1**.

3.1 Considerations Not Carried Forward For Further Analysis

3.1.1 Water Supply and Wastewater Treatment

The Proposed Project does not require an offshore utility scale water supply nor does it involve the treatment of wastewater. Therefore the Proposed Project would not have any impact to water supply or treatment systems.

3.1.2 Land Use

The Proposed Project would not result in any changes to land use in the Project area or adjacent to it. Consequently, there would be no impacts associated with land use as a result of the Proposed Project.

3.1.3 Terrestrial Transportation and Traffic

For the terrestrial work, the Proposed Project would require personnel and vehicles to travel along local roads such as Tennessee Avenue (under which the electric cable would be installed) and US Route 30, also known as Absecon Avenue. Installation of the terrestrial components of the Proposed Project (i.e., vault and cable) would occur at the terminus of Tennessee Avenue and therefore interruptions to traffic flow would be minimal. Street impacts would be primarily associated with installation of the planned manholes and access to the cable run.

Installation and maintenance of the offshore turbines would generate a small amount of vehicular traffic associated with the transportation of construction workers and supplies to supply vessel docking areas in Atlantic City; however, the Proposed Project would result in a negligible increase in vehicular traffic and would not require a long-term change in traffic circulation or pattern. No new roads would be required for the Proposed Project.

The regional and state roads that convey traffic directly into and from Atlantic City are as follows:

- The Atlantic City Expressway (ACE) is a major arterial toll road running in a northwest to southeast direction.
- The aforementioned US Route 30 also runs in a general northwest to southeast direction, and is a principal arterial road that begins in New Jersey at the Benjamin Franklin Bridge and ends at Absecon Boulevard in Atlantic City.
- The Black Horse Pike (US Route 40/322) is a major access road into the City from portions of the state that are generally to the south and west. This road is under State jurisdiction within Atlantic City.
- The Atlantic City – Brigantine Connector (ACBC) is a limited access roadway linking the ACE with US 30.

- Brigantine Boulevard, also known as Route 187, is a recently-completed State highway connecting the ACBC and US Route 30.

Regional traffic is also fed into the City by the Garden State Parkway and US Route 9. The major county roads that feed into the City are Routes 561 (Jimmy Leeds Road), 563 (Tilton Road), 651 (Fire Road), and 585 (Shore Road). One minor county road, 629 (West End Avenue), connects US 40/322 to the south of the City. As for municipal streets, the most important are Atlantic and Pacific Avenues which serve the downtown area.

Atlantic City has an extensive public transportation system. The City is served by the Atlantic City Rail Line, initiated by NJ Transit in 1989. NJ Transit also has a fixed-route bus service. The Atlantic City Jitney Association is composed of 190 individually-owned and operated 13-seat minibuses called Jitneys which are the main transportation alternative to the NJ Transit bus system (New Jersey Department of Transportation 2008).

There would be no anticipated impacts to terrestrial transportation resulting from implementation of the Proposed Project and, therefore, this resource is not carried forward for detailed analysis.

3.1.4 Shipping Channels

For the in-water work, the Proposed Project would require the use of barges and other vessels for the transport of personnel and materials out to the construction site. The details of these transports are discussed in **Section 2.2** of this EA. The turbines would be situated within navigable waters of the Atlantic Ocean, but not within any federal navigation channels or areas considered major navigation channels, as shown on the National Oceanic and Atmospheric Administration (NOAA) Service Charts (National Ocean Service Chart No. 12316). A vessel collision study (ABSG Consulting, Inc. 2011) determined that it is unlikely that the proposed wind farm would have a long-term detrimental impact on shipping activities in the area, as there are no major shipping lanes within several miles of the facility and there are no major port entry points near the facility. While the New York Bight is one of the busiest waterways in the world, the merchant vessels that enter New York would pass more than 10 miles from the facility.[3] Consequently, there would be no anticipated impacts to shipping channels resulting from implementation of the Proposed Project and, therefore, this resource is not carried forward for detailed analysis.

3.1.5 Wetlands

Based on the 1987 USACE Wetland Manuel, there were no federally regulated wetlands adjacent to the power plant or within its immediate vicinity (L.M. Slavitter, USACE, personal communication, 2015). However, the USFWS National Wetlands Inventory (NWI) and NJDEP maps (**Figure 6**) depict a palustrine, scrub-shrub, broad-leaved deciduous/broad-leaved evergreen, saturated wetland just north/northeast of the

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[3] A bight can be simply a bend or curve in any geographical feature, usually a coast. Alternatively, the term can refer to a large bay. It is distinguished from a sound by being shallower.

Huron Substation and a palustrine, scrub-shrub, needle-leaved evergreen/broad-leaved deciduous, saturated wetland just northwest of the Huron Substation, but both are located outside the Project area (USFWS 2014c). There is also a marine, intertidal, unconsolidated shore, sand, irregularly flood wetland and a marine, intertidal, unconsolidated shore, sand, regularly flood wetland depicted along the beach; however, these wetlands are not considered to be within the Project area as jet plowing technology would be used to bury the export and inter-array cables to a target depth of 6 feet below the seabed in this area.

As part of the permit development process for the Project, a delineation of wetlands in the vicinity of the Huron Substation was completed, as well as measurement of the wrack line at the shoreline as a means of concerning mean high tide lines. The delineation was conducted in accordance with the guidance described in the NJ Freshwater Wetlands Protection Act for the NJDEP and USACE 1987 Wetland Delineation Manual. It should be noted that the state uses the 1989 Federal Manual for Identifying and Delineating Jurisdictional Wetlands while the USACE is required under law to use the Corps of Engineers 1987 Wetland Delineation Manual. The NJDEP delineation confirmed the presence of emergent wetlands, dominated by common reed (*Phragmites australis*) to the east of the substation. However, the cable run to the substation would be located along the western side of the substation; therefore, no further action was required relative to these wetlands. The USACE performed a site inspection on July 28, 2010 to determine if any wetlands would be impacted near the Huron Substation where the cable would terminate. Per the 1987 Corps of Engineers Wetland Delineation Manual, there are no wetlands located in the vicinity of the substation.

The construction of the proposed turbines and the installation of the submarine transmission cable would not result in any direct or indirect alteration or impairment of the freshwater wetlands located near the Proposed Project boundaries. The cable connecting the wind farm to the Huron substation would be installed using HDD technology under the road and would not impact sensitive dunes or beach systems.

There would be no anticipated adverse impacts to wetlands resulting from implementation of the Proposed Project and, therefore, this resource is not carried forward for detailed analysis.

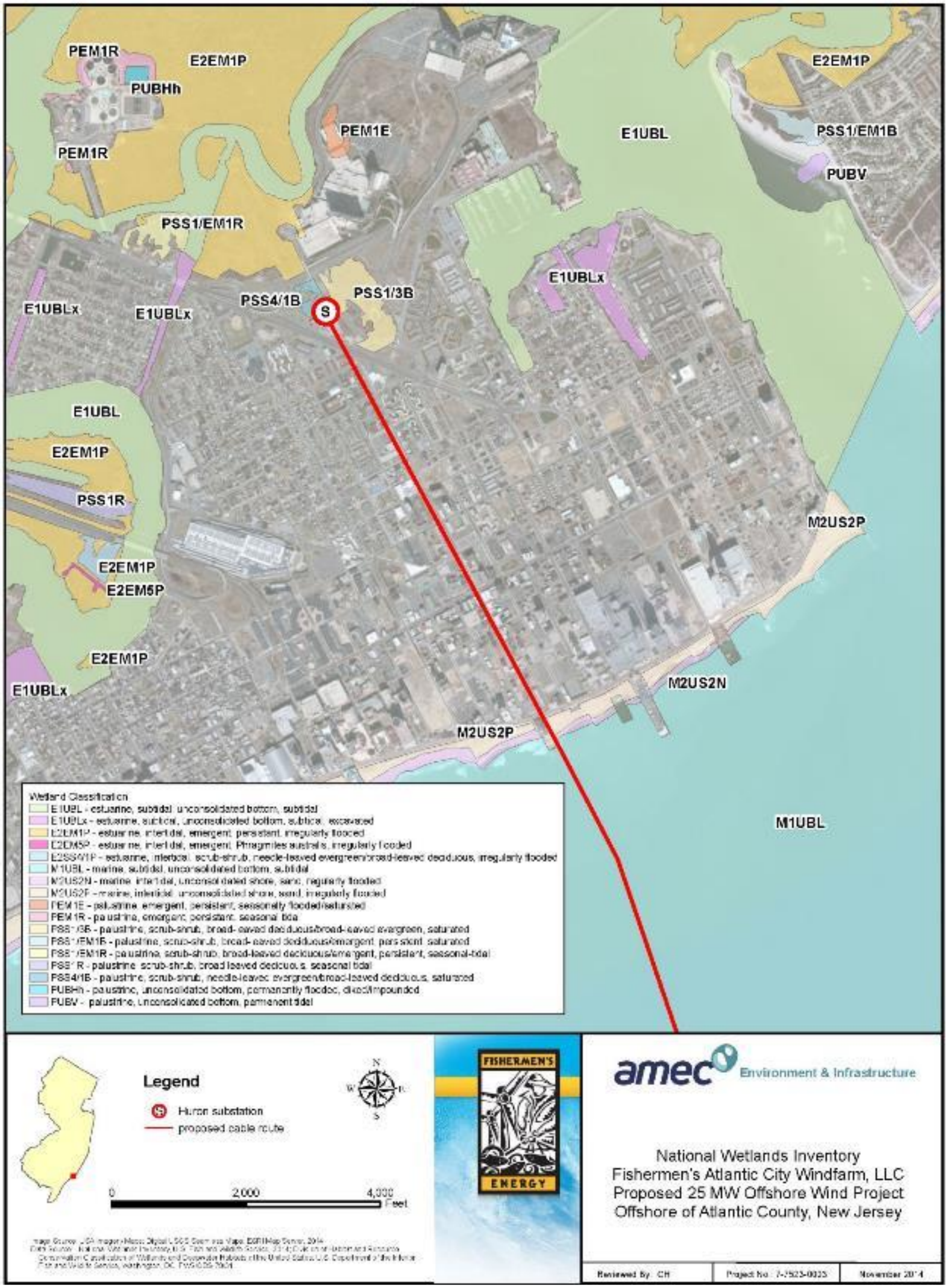

Figure 6. National Wetlands Inventory (NWI) Data for the Project Area.

3.1.6 Aquatic and Terrestrial Vegetation

A review of the New Jersey Submerged Aquatic Vegetation Distribution Atlas (Macomber and Allen 1979) was completed for the in-water Project area. The maps indicate that the proposed turbine locations and the submerged transmission cable would not be placed in areas with known submerged aquatic vegetation (SAV) (Macomber and Allen 1979).

For upland areas in the vicinity of the proposed cable route and the substation area, the upland plant species along the proposed cable route from landfall to the Huron Substation (i.e., along Tennessee Avenue) were identified during a site visit conducted by a botanist on October 12, 2009 and are summarized in **Table 3-1**. Most of these species are typical of urban or developed areas of New Jersey.

The seabeach amaranth is a federally threatened plant species under the ESA, which has the potential to occur in the Project area. Seabeach amaranth is native to Atlantic coast barrier islands and occurs in overwash flats at expanding ends of barrier islands, lower foredunes, and upper strands of non-eroding beaches (USFWS 2012). The species is dependent on a terrestrial, upper beach habitat that is not flooded during the growing season. Potential habitat for seabeach amaranth was not found onshore during the October 12, 2009 site visit described above in the vicinity of the proposed cable running from the offshore wind turbines to the onshore substation. A summary of the USFWS consultation, including the seabeach amaranth, is provided in **Section 2.5.2.2**.

Due to the lack of SAV in the Project area and the proposed use of HDD technology to go under the near shore area and Tennessee Avenue, the Proposed Project would not impact SAV. Similarly, seabeach amaranth, a federally threatened species, is not known to occur near the cable route. Even if seabeach amaranth were found to be present, the proposed use of HDD technology would minimize any impacts on the landscape, including the beach, so that the Proposed Project would not impact this federally listed species. Most of the upland species, located along the proposed cable route from landfall to the Huron Substation, are typical landscape specimens or ruderal species (i.e., plants that colonize disturbed areas), typical for urban or developed areas of New Jersey. Disturbances to terrestrial vegetation would be extremely limited and would be associated with the proposed development of several manholes for access to the underground cable, and day-lighting (i.e., where the underground cable emerges above ground) of the cable at the Huron Substation. The cable route would follow along existing street alignments beneath developed land, thereby avoiding the need to encroach undisturbed areas, and would connect to an existing substation.

There would be no anticipated adverse impacts to aquatic or terrestrial vegetation resulting from implementation of the Proposed Project and, therefore, this resource is not carried forward for detailed analysis.

Table 3-1. Plants Observed Along the Proposed Cable Route from Landfall to the Huron Substation

Scientific Name	Common Name	Wetlands Indicator
Trees		
Juniperus virginiana	Eastern red cedar	FAC-
Morus alba	White mulberry	NL
Platanus occidentalis	American sycamore	FAC+ (-)
Shrubs		
Elaeagnus umbellata	Autumn olive	NL
Rhus copallinum	Winged sumac	NI
Vines		
Parthenocissus quinquefolia	Virginia creeper	FAC-
Herbaceous		
Ammophila breviligulata	American beach grass	FAC- (-)
Artemisia vulgaris	Common mugwort	NL
Asclepias sp.	Milkweed	NA
Cichorium intybus	Chicory	NL
Daucus carota	Queen Anne’s lace	NL
Digitaria sanguinalis	Crabgrass	FAC- (-)
Erigeron strigosus	Lesser daisy fleabane	FAC- (+)
Melolitus alba	White sweetclover	FAC- (-)
Melolitus officinalis	Yellow sweetclover	FAC- (-)
Phragmites australis	Common reed	FAC+
Plantago lanceolata	English plantain	NL
Rumex acetosella	Sheep sorrel	NL
Setaria sp.	Foxtail	NA
Solidago rugosa	Rough-stemmed goldenrod	FAC
Trifolium pratense	Red clover	FAC- (-)
Trifolium repens	White clover	FAC- (-)

NA = Not Applicable – Undetermined species. Indicator status cannot be assigned to a genus.
NL = Not Listed – Indicates a species that is not found in wetlands in any region.
NI = No Indicator – Species with insufficient information to determine an indicator status.
FAC = Facultative - Equally likely to occur in wetlands or non-wetlands (estimated probability 34 percent-66 percent).
FAC+ = Facultative Wetland – Usually occur in wetlands (estimated probability 67 percent-99 percent), but occasionally found in non-wetlands.
FAC- = Facultative Upland – Usually occur in non-wetlands (estimated probability 67 percent-99 percent), but occasionally found in wetlands (estimated probability 1 percent-33 percent).

Note: A negative sign (-) indicates a frequency towards the lower end of the category (less frequently found in wetlands); a plus sign (+) indicates a frequency towards the higher end of the category.
Source: Phil Perhamus (AMEC site visit, October 12, 2009), observations along Tennessee Avenue

3.1.7 Terrestrial Mammals

There were no terrestrial mammal species observed in the Project area during site visits on July 23, 2009 and October 12, 2009. Small mammals adapted to living in populated, urban settings such as raccoon (*Procyon lotor*), opossum (*Didelphis marsupialis*), Norway rat (*Rattus norvegicus*), or house mouse (*Mus musculus*) could potentially utilize the residential and commercial areas located along the proposed cable route, particularly in areas with food refuse either in garbage receptacles or dumpsters. However, no federally listed species or federally designated critical habitat for terrestrial species is known to occur within the Project area. Disturbances to common terrestrial mammals during construction would be limited and would be associated with the proposed development of several manholes for access to the underground cable, and day-lighting of the cable at the Huron Substation. Temporary construction related impacts (e.g., noise) may indirectly disturb terrestrial mammals; however, these impacts would be temporary and minor as small mammals known to occur in the Project area are adapted to human land uses. Further, the proposed cable route would follow along existing street alignments beneath developed land, thereby avoiding the need to encroach undisturbed areas, and would connect to an existing substation.

There would be no anticipated adverse impacts to terrestrial wildlife resulting from implementation of the Proposed Project and, therefore, this resource is not carried forward for detailed analysis.

3.1.8 Intentional Destructive Acts

Installation and operation of the Proposed Project would not involve the transportation, storage, or use of radioactive, explosive, or toxic materials. The Proposed Project would not be located near any national defense infrastructure or in the immediate vicinity of a major inland port, container terminal, freight trains, or other substantial national structure. Further, the Proposed Project would be a single component of a diversified power grid. Consequently, implementation of the Proposed Project would not result in a substantial potential for disruption of electrical service. The Proposed Project would not be considered to offer any targets for intentional destructive acts.

There would be no anticipated adverse impacts associated with intentional destructive acts resulting from implementation of the Proposed Project and, therefore, this resource is not carried forward for detailed analysis.

3.2 Physical Resources

The following sections contain specific information regarding the physical environment in which the Proposed Project is sited. The Proposed Project would have negligible effects on topography and elevation, geology and soils, and weather; however, impacts related to air quality and noise are discussed in **Section 3.2.2**, below.

3.2.1 Affected Environment

The following sections outline the existing environment that would be potentially affected by the Proposed Project.

3.2.1.1 Topography and Elevation

Atlantic City is located on the Coastal Plain physiographic province, which is comprised of unconsolidated deposits that dip gently to the southeast (Dalton 2006). The area in and surrounding Atlantic City has relatively flat topography with elevations ranging from sea level to approximately 8 feet above mean sea level (msl).

The sea floor off of the Atlantic City shoreline slopes gently to the southeast and water depths range from approximately 25 to 40 feet in the Project area approximately 2.8 nautical miles from shore. Regional bathymetric or submarine topographic maps compiled by NOAA and a marine geophysical survey of the Project area (Alpine Ocean Seismic Survey, Inc. 2011) indicate that there are no steep slopes, canyons, or other irregular bathymetric features within or adjacent to the proposed in-water Project area. The survey identified the average depth of the turbine block survey area as approximately 38 feet. Additionally, the minimum and maximum depths measured along the cable route were measured at approximately 11 feet and 42 feet respectively, with depths increasing gradually to the southeast until a sand ridge is encountered (**Figure 7**) (Alpine Ocean Seismic Survey, Inc. 2011). Several similar sand ridge features are located north of the survey area, although these shoals appear to trend more northeast to southwest. Collectively these sand features form a ridge and swale topography (Alpine Ocean Seismic Survey, Inc. 2011). This feature is most likely maintained by strong wave motion and longshore currents in the modern environment. These features are particularly common offshore headlands. Additionally, a somewhat subtle yet potentially important feature is a narrow dip or bathymetric low near shore (approximately 0.70 nautical miles offshore). Based on the limited extent to which this low feature is mapped, it appears that it is relatively narrow (i.e., less than approximately 1,650 feet wide), linear, and orientated at an angle to the shoreline. It is possible that this shallow channel-like feature in the surficial sediments is the result of scour. Another possible interpretation of this feature is that this bathymetric low represents seafloor located between two adjacent sediment bedforms (Alpine Ocean Seismic Survey, Inc. 2011).

3.2.1.2 Geology and Soils

The New Jersey Coastal Plain Drilling Project and the New Jersey Sea-level Transect projects, including data from a deep borehole at the Atlantic City Coast Guard Station (ODP Leg 150X), have provided detailed geological information for the Project area. The Project area appears to be underlain by the unconsolidated Cape May Formation (upper Pleistocene-Holocene; 2 million years to 10,000 years ago) to a depth of approximately 230 feet below msl (Miller et al. 1994). Site-specific data regarding the seafloor and sub-bottom conditions were collected during geotechnical and geophysical surveys in 2010, 2011 and 2012. As part of the permitting processes, benthic grab samples were collected on November 16 and 18, 2010 (Normandeau 2011b). Additionally, borehole investigations were conducted to a depth of 150 feet below the seafloor at each of the six proposed turbine locations during 2011 (Alpine Ocean Seismic Survey, Inc. 2011). The borehole results were consistent with the geologic description of the region. The discussion below presents general regional information for soils throughout the Project area.

The shallow seafloor in the Project area consists of unconsolidated siliciclastic or silica-rich sedimentary deposits composed of a mixture of sand-size grains with similar-sized shell fragments and organic matter (**Figure 8**).

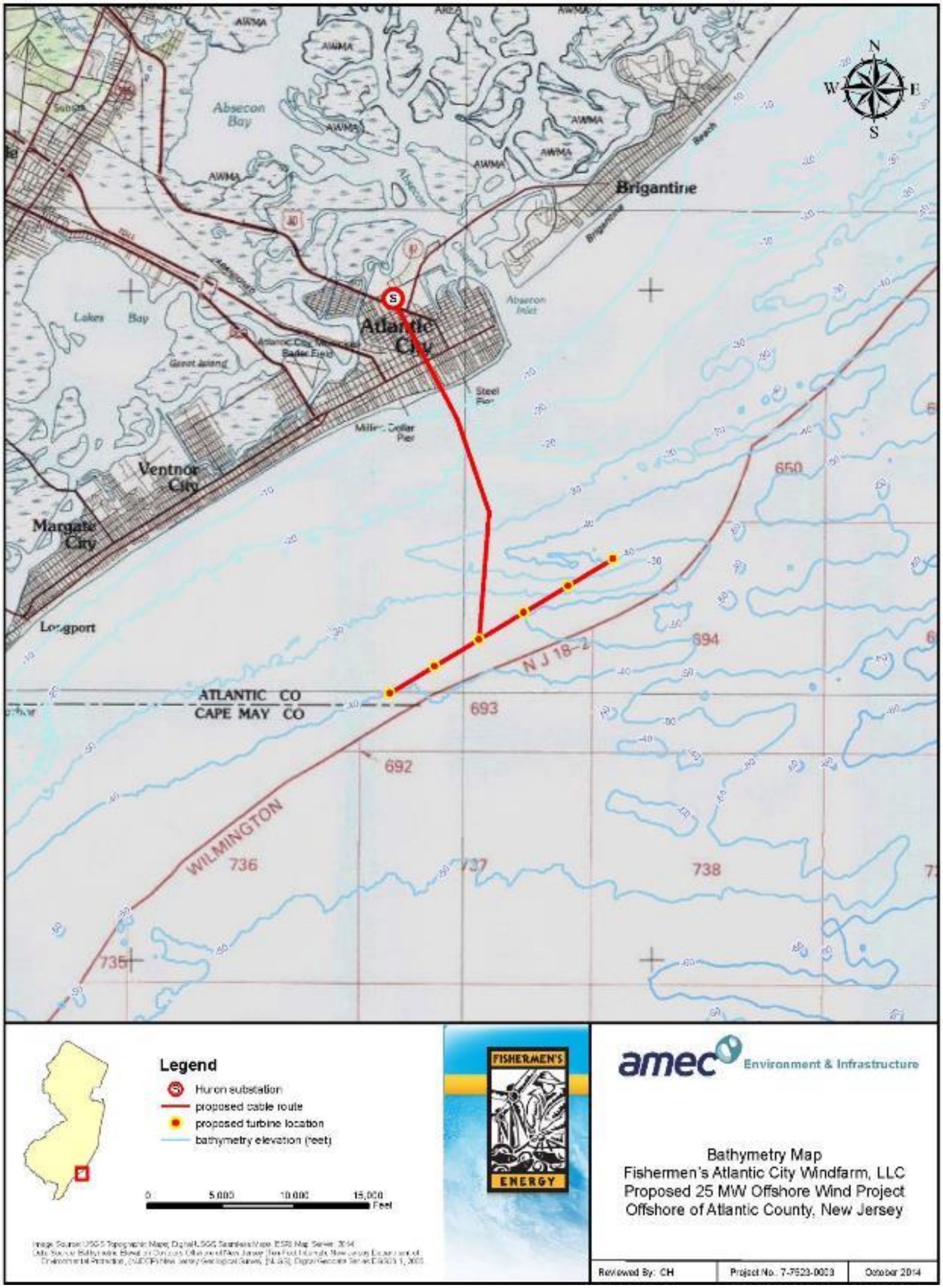

Image Source: USGS Topographic Maps; Digital USGS Seamless Maps, ESRI Map Server, 2014
Data Source: Bathymetric Elevation Contours, Offshore of New Jersey (Ten Foot Intervals), New Jersey Department of Environmental Protection, (NJDEP) New Jersey Geological Survey (NJGS) Digital Geodata Series DGS05-1, 2005

Figure 7. Bathymetry in the Project Area.

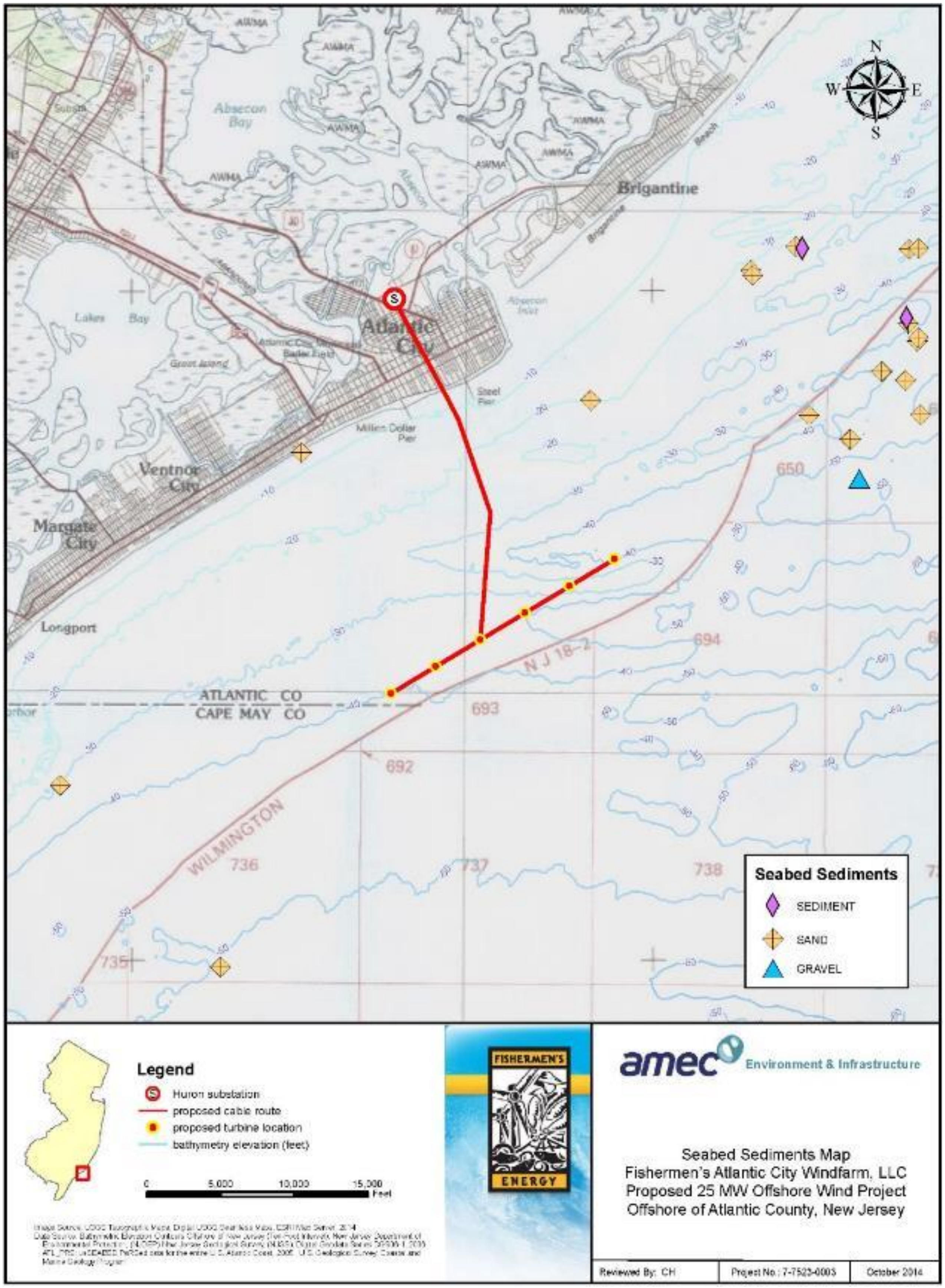

Figure 8. Sediment Types within the Vicinity of the Project Area.

The sediments beneath the estuary are similar in composition to those offshore of the barrier islands with the principal exception of higher organic matter content. The estuarine habitat is also host to somewhat different biota than farther offshore. Similarly, seafloor sediments are constantly undergoing physical mixing and biogeochemical processes by the actions of microorganisms, other invertebrates, and water movement.

The proposed upland cable route is located in Atlantic County within the Outer Lowland portion of the Coastal Plain Province (New Jersey Geological Survey [NJGS] 2003). The Outer Coastal Plain physiographic section of New Jersey consists of alternating layers of sand, silt, and clay deposited in coastal and marine settings (NJGS 1999). Regionally, the Coastal Plain is the largest physiographic province in New Jersey with an area of 4,667 square miles, occupying about three-fifths of the state. The unconsolidated deposits dip gently to the southeast and range in age from the upper Lower Cretaceous to the Miocene (90 to 10 million years old) (NJGS 2003).

The surficial geology along the proposed upland cable route is listed as beach and nearshore marine sand and salt-marsh and estuarine deposits overlaying Belleplain Member bedrock (NJDEP 2012a). The Belleplain Member is a part of the Kirkwood Formation. Sand in the Belleplain is mostly quartz with a minor amount of siliceous rock fragments. The upper 33 feet is finely laminated, dark-gray clay with common, thin interbeds of fine- to medium-grained, micaceous quartz sand. The Belleplain Member is greater than 338 feet thick along the coast from Strathmere to Cape May, Cape May County (US Geological Survey [USGS] 2009).

There are three types of soil depicted along the proposed cable route (**Figure 9**). They are listed as Hooksan-Urban land complex, 0 to 10 percent slopes, rarely flooded; Psamments, 0 to 3 percent slopes; and Psamments, sulfidic substratum, 0 to 3 percent slopes, frequently flooded. The Hooksan series is very deep, excessively drained, sandy marine sediment with very rapid permeability. It is typically found in the Coastal Plain on dunes adjoining sandy beaches. The area with Psamments soils was previously described in the Soil Survey of Atlantic County (Natural Resources Conservation Service [NRCS] 1990) as fill land over tidal marsh. Fill land over tidal marsh was described as tidal marsh that has several feet or more of sandy fill material deposited or pumped on it from nearby streams in dredging operations. Most of this land type is prone to flooding from extremely high tides during coastal storm events. The fill material was described as having low natural fertility and very low organic matter content. In most places, fill land over tidal marsh soils were considered excessively drained (NRCS 1990).

Figure 9. Upland Soils in the Project Area.

3.2.1.3 Weather

The climate of the Project area is characteristic of an eastern coastal region, which is generally less prone to rapid temperature changes and extremes due to oceanic proximity and the Atlantic's high heat capacity. Water temperature offshore varies seasonally along the coast. The average annual water temperature is 57.3 degrees Fahrenheit (°F) with the highest temperatures being recorded in August (average 73.0 °F) and the lowest temperatures in January (average less than 37 °F) (NOAA 2014c). Similarly air temperature also varies with an average temperature of 55.6 °F as well as average minimum and maximum temperatures of 49.5 °F and 61.6 °F, respectively (National Climatic Data Center [NCDC] 2010). Additionally, an annual average precipitation of 40.1 inches was recorded for coastal New Jersey during the period between 1981 and 2010 (NCDC 2010). Periods of snowfall generally range from mid-November to mid-April in southern New Jersey with an annual average snowfall of 16.8 inches (Northeast Regional Climate Center 2008).

New Jersey is located in the mid-latitude Atlantic shore, and the climate and prevailing winds in immediate offshore waters are controlled primarily by large-scale mid-latitude westerly winds (Northeast Regional Climate Center 2008). Prevailing winter winds are west-northwesterly; summer winds are predominantly southerly. Winter winds are generally stronger because of large atmospheric temperature and pressure gradients. A small-scale sea breeze circulation often develops along the coastline, and can be felt up to 6 miles offshore during periods of large land-ocean temperature contrasts.

3.2.1.4 Air Quality

Regional Setting

The ambient air quality in an area can be characterized in terms of whether or not it complies with the primary and secondary National Ambient Air Quality Standards (NAAQS). The Clean Air Act (CAA) Amendments (CAAA) requires the USEPA to set NAAQS for pollutants considered harmful to public health and the environment. Primary NAAQS set limits to protect health, including the health of sensitive populations such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings (USEPA 2012). NAAQS are provided for six principal pollutants, termed criteria pollutants (as listed under Section 108 of the CAA), including the following:

- Carbon monoxide (CO)
- Lead (Pb)
- Nitrogen oxides (NO_x)
- Ozone (O_3)
- Particulate matter, divided into two size classes:
- Aerodynamic size less than or equal to 10 micrometers (PM_{10})
- Aerodynamic size less than or equal to 2.5 micrometers ($PM_{2.5}$)
- Sulfur dioxide (SO_2)

The Proposed Project is located in the Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE Interstate Air Quality Control Region (AQCR) (USEPA 1972) which is designated as moderate nonattainment for O_3

(USEPA 2014). In addition, the Proposed Project is also located in the Northeast Ozone Transport Region (OTR). Therefore, the Proposed Project must evaluate air emissions of O_3 precursors (volatile organic compounds [VOCs] and NO_x) from construction and operation of the Proposed Project and demonstrate compliance with the O_3 State Implementation Plan (SIP) for New Jersey.

Greenhouse Gases

On 18 December 2014, the CEQ released updated draft guidance on how and when federal agencies should account for the effects of greenhouse gas emissions and climate change impacts under NEPA. The guidance uses projected greenhouse gas emissions as a proxy for assessing an action’s potential climate change impacts. The guidance also directs agencies to consider the direct, indirect and cumulative effects of the greenhouse gas emissions from an action, and take into account the effects of connected actions.

Global climate change is a transformation in average weather, which can be measured by changes in temperature, wind patterns, and precipitation. Scientific consensus has identified human-related emission of greenhouse gases above natural levels as a substantial contributor to global climate change (US Climate Change Science Program [USCCSP] 2009). Greenhouse gases trap heat in the atmosphere and regulate the Earth’s temperature. They include water vapor, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), ground-level O_3, and fluorinated gases such as chlorofluorocarbons and hydrochlorofluorocarbons.

General Conformity

The wind turbines and transmission cable would be located in the waters of the State of New Jersey. The New Jersey transmission landfall transition and substation are located in Atlantic County, New Jersey. Under the Energy Policy Act of 2005, air quality impacts from marine vessels and non-road equipment operating at offshore wind projects located in state waters are regulated under the General Conformity requirements. Projects located in federal waters are regulated by the USEPA and subject to regulations promulgated to address projects on the Outer Continental Shelf (OCS) (40 CFR Part 55).

The 1990 CAAA include the provision of General Conformity, which is intended to ensure that federal actions (financing, permits, facilities, etc.) conform to the nonattainment area’s SIP; thus not adversely impacting the area’s progress toward attaining the NAAQS. The General Conformity Rule is codified in 40 CFR Part 51, Subpart W and Part 93, Subpart B, “Determining Conformity of General Federal Actions to State or Federal Implementation Plans” (General Conformity Rule). The General Conformity Rule regulates air pollutant emissions associated with actions that are federally funded, licensed, permitted, or approved, and ensures emissions do not contribute to air quality degradation or prevent the achievement of state and federal air quality goals. In short, General Conformity, if applicable, refers to the process to evaluate plans, programs, and projects to determine and demonstrate that they satisfy the requirements of the CAA and applicable SIP.

The process to determine conformity for a proposed action involves two steps: applicability and determination. Applicability is an assessment of whether a proposed action is subject to the General Conformity Rule. If the emissions associated with the Proposed Project exceed the applicability thresholds for New Jersey (set by the NJDEP) under the General Conformity Rule, a General Conformity

Determination would be required for the Project. Both construction and operational emissions from sources which do not require air permitting must be evaluated. If the emissions associated with the Proposed Project are less than the applicability thresholds, the Project is said to conform to the New Jersey SIP.

3.2.2 Environmental Impacts Related to Physical Resources

There would be no adverse or beneficial impacts, over the short- or long-term, to topography and elevation, geology and soils, or weather, that would result from construction, operations and maintenance, or decommissioning activities associated with the Proposed Project. Potential impacts to air quality are discussed in further detail below.

3.2.2.1 Air Quality

General Conformity

As part of the permitting process for the Proposed Project, a general conformity analysis was conducted in conformance with Title 40 of the CFR Part 51, Subpart W and Part 93, Subpart B, *Determining Conformity of General Federal Actions to State or Federal Implementation Plans*. This analysis was conducted based on the most current construction schedule for the Proposed Project and is summarized below. The results of this analysis demonstrate that projected emissions from the construction, operations and maintenance, and decommissioning of the 25-MW wind farm would not exceed General Conformity applicability thresholds and a full general conformity determination is not required for the Project. DOE submitted a General Conformity Applicability Analysis to the U.S. Environmental Protection Agency on February 5, 2015. The U.S. Environmental Protection Agency (by email on March 6, 2015) concurred with the determination that the Proposed Action would not exceed General Conformity applicability thresholds.

Applicability Determination

As required under General Conformity, an applicability evaluation was conducted for the Proposed Project to determine if the total direct and indirect emissions for non-attainment pollutants in the Project area exceed the annual *de minimis* levels specified in Title 40 CFR Part 58.853(b)(1) and (2). The general conformity applicability threshold for O_3 precursors for an area in either moderate or basic O_3 nonattainment within an OTR or in a maintenance area is 50 tons per year (tpy) of VOCs and 100 tpy of NO_x.

Applicability is based on both direct and indirect emissions from the Proposed Project and includes construction of the wind turbines, construction of the upland and marine transmission cable segments, and all marine vessels used to transport construction equipment and perform construction activities. In addition, vessel emissions during operations are also evaluated for applicability to conformity requirements.

Emission Sources

The following sections identify the direct and indirect emission sources associated with the Proposed Project, and the corresponding emission estimates for those sources.

Marine Vessels

Marine vessel emission factors were obtained from USEPA's Current Methodologies in Preparing Mobile Source Port-Related Emissions Inventories (April 2009) Table 3-8 Harbor Craft Emission Factors (g/kWh), Tier 2 engines. In addition, load factors for the various types of vessels were obtained from Table 3-4 Load factors for Harbor Craft. A load factor of 0.31 was used for the all of the tug boats as the tug boats would only operate at higher load factors while towing the barges to the offshore construction site. Based on the construction schedule, it was conservatively assumed that the vessels would be operating with their engines running for 24 hours per day from June 14 to August 14 of the construction year for a total of 61 days of offshore construction. For operational emissions, it was assumed that wind turbine maintenance would occur 213 days out of the year for 10 hours per day.[4]

Non-Road Equipment

Emission factors for the non-road construction equipment used for both the upland and marine construction were calculated using USEPA's NONROAD2008 model. The NJDEP issued a draft permit for the Proposed Project requiring the use of either Tier 4 engines or engines that meet Tier 2 non-road emissions standards plus the best available emissions control or technology technically feasible for the operation. Emissions calculations have been performed to be conservative and reflect a worst case methodology. In the case of NO_x, emissions reflect Tier 2 factors for all nonroad equipment. $PM_{2.5}$ and PM_{10} emissions are based on Tier 3 factor since the Tier 3 $PM_{2.5}$ and PM_{10} factors reflect a more conservative estimate than Tier 2. VOCs, CO and SO_2 emissions reflect the Tier 3 factors as there is minimal difference between the Tier 2 and Tier 3 factors for Project equipment. Activity factors for each piece of equipment were also obtained from NONROAD2008. Annual emissions were based on the construction schedule for the upland and marine segments. For the upland transmission schedule, HDD construction was assumed to occur for 10 hours per day for 55 days, except for two excavators, which would only operate for 30 days.

For construction of the wind turbine foundations, installation activities would occur for 24 hours per day and take approximately 37 days to complete. For construction of the wind turbines, installation would occur for 24 hours per day and take approximately 25 days to complete. Installation of the underwater cable (i.e., the deck barge cable plow pump and deck barge cable engine) is anticipated to occur for 24 hours per day and take approximately 27 days to complete. These estimations assume that the non-road engines are running for the entire time, which is a conservative assumption since New Jersey Administrative Code (N.J.A.C.) 7:27-14 and 15 (and the NJDEP Division of Land Use Draft Permit Condition 28) require that all non-road construction equipment comply with the 3-minute idling limit.

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[4] The emissions do not account for shut down of any engines when not in use.

On-Road Trucks

Emission factors for the materials delivery trucks were calculated using USEPA's MOVES2010 model. MOVES2010 provides emission factors for NO_x, CO, VOC, PM_{10} and $PM_{2.5}$ in grams per vehicle mile travelled for various vehicle types. In addition to the vehicle and road types, MOVES also calculates emissions by 16 speed bins reflecting travel speeds of 2.5 miles per hour (mph) to 75 miles per hour, with the highest emissions occurring at the lowest travel speed. Due to the large size of the MOVES output, July was selected to reflect the maximum volatile emission rates. As a conservative estimate, the maximum criteria pollutant emission factors for all days, hours, road types, and all vehicle types for speed bin 1 (less than 2.5 mph) were used to estimate the mobile source criteria pollutant emissions from Project construction for comparison to conformity thresholds. This is very conservative since the NJDEP permit for the Project limits idling to no more than three minutes.

Greenhouse Gas Emissions

Emissions from the construction and operation of the FACW offshore wind farm were evaluated using the December 2014 CEQ guidance. To comply with the CEQ draft December 2014 GHG emissions guidelines, anticipated GHG emissions from the construction and operation of the Project were evaluated. In addition, GHG emissions reductions from displacing combustion generated electricity with wind generated electricity were quantified to assess the action versus no action alternative on GHG emissions. CEQ guidelines recommend that a GHG analysis takes into account both the short- and long-term effects and benefits over the life of a Project and the duration of the generation of emissions. In addition, CEQ guidelines provide a reference point of 25,000 metric tons of CO_2e for analysis under the guidelines. CEQ notes that the 25,000 metric ton reference point is not an applicability threshold and projects with emissions below this level may still require evaluation. As demonstrated below, Project emissions are well below 25,000 metric tons. However, an analysis of the Project on GHG emissions is presented below.[5]

The primary source of GHG emissions from the Project are those related to construction of the wind turbines, underwater cable, and upland connection. Some emissions are expected to also occur during operations to allow for maintenance and repair of the wind turbines. **Table 3-2** presents the GHG emissions from the construction of the Project as calculated for marine vessels, nonroad equipment, on-road mobile sources, and a stationary generator.

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[5] Note that emissions are provided in tons in the tables below. A metric ton is equal to 0.91 short tons.

Table 3-2. Estimated Displaced GHG Emissions for a 25 MW Wind Farm in New Jersey

Pollutant	lb/MWh	MWh/year	Tons/Year	Lifetime Tons[1]
CO_2	1,227.10	68,571	42,072	1,051,800
CH_4	0.04	68,571	1.54	35
N_2O	0.01	68,571	0.43	10
CO_2e	1227.16	68,571	42,238	1,055,949

[1] Lifetime tons assumes a 25 year operational lifetime for the wind farm.

The annual capacity factor used to estimate the annual megawatts generated by the wind farm is 31 percent based on an earlier study conducted for the wind farm. This capacity factor is within the range estimated by the New Jersey Board of Public Utilities and the National Renewable Energy Lab (in conjunction with the Bureau of Ocean Energy Management) for New Jersey offshore wind farms.

The results of this analysis show that the GHG emissions from construction and operation of the Project (build alternative) of 23,000 and 500 tons, respectively will be significantly less than the GHG emissions displaced by the wind farm (no build alternative) in a single operational year (42,238 tons) and over the lifetime of the Project (1,055,949 tons). Therefore, the Project would result in overall decreased GHG emissions once operational.

The effects of climate change on the Project include the potential for more severe storms and a rise in sea level. Engineering design of the structures requires that all components are able to withstand environmental conditions experienced during a 100-year return interval storm event. Based on historical studies of site conditions and a MetOcean Solutions Ltd report developed specifically for this Project area, the 100-year storm conditions present maximum wind speeds of 112 mph and maximum wave heights of 37 feet.

Construction Phase

Construction emissions were calculated for the following segments of construction:

- Marine emissions for construction of the upland transmission cable connection;
- Emissions from non-road combustion equipment for construction of the upland transmission cable connection and underground transmission cable;
- Mobile source (on-road) emissions from construction of the upland transmission cable;
- Emissions from non-road combustion equipment for installation of the wind turbine foundations and wind turbines; and
- Offshore marine emissions for installation of the wind turbine foundations, wind turbines, and underwater cable.

Table 3-3 provides a summary of the calculated Proposed Project construction emissions compared to the General Conformity *de minimis* emission levels for the Project area. The emissions include offshore emissions from construction of the wind turbines and land based emissions from the upland cable connection.

Table 3-3. Comparison of Construction Emissions to Conformity Applicability Levels

Pollutant	*de minimis* Emission Levels (tpy)	Total Construction Emissions (tpy)
NO_x	100	63.39
VOC	50	6.68
CO	N/A	26.94
PM_{10}	N/A	1.13
$PM_{2.5}$	N/A	1.04
SO_2	N/A	0.60
tpy – tons per year N/A – Not applicable as Atlantic County is in attainment for those pollutants		

Construction of the Proposed Project would be completed within 9 months, therefore total Project emissions are conservatively assumed to occur within 1 calendar year. A review of the total construction emissions in the above table shows that both VOC and NO_x are below the General Conformity *de minimis* emission levels. Therefore, the Proposed Project does not require a formal General Conformity determination. Emissions during the construction phase of the Proposed Project would result in minor short-term adverse impacts to air quality.

Operations and Maintenance Emissions

During operation of the Proposed Project, there would be emissions from marine vessels (approximately one per week) that would provide maintenance to the wind turbines.[6] Emissions during operations were also calculated for comparison to General Conformity applicability thresholds. A summary of operational emissions is provided in **Table 3-4**.

Table 3-4. Comparison of Operational Emissions to Conformity Applicability Levels

Pollutant	*de minimis* Emission Levels (tpy)	Total Operational Emissions (tpy)
NO_X	100	64.83
VOC	50	1.78
CO	NA	26.88
PM_{10}	NA	1.92
$PM_{2.5}$	NA	1.86
SO_2	NA	26.88
tpy – tons per year N/A – Not applicable as Atlantic County is in attainment for those pollutants		

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[6] No back-up generators would be used by the Proposed Project; therefore, back-up generator use was not included in the air quality modeling analysis.

A review of the total operational emissions in the above table shows that both VOC and NO_x are below the General Conformity *de minimis* emission levels. Therefore, the Proposed Project does not require a formal General Conformity determination. Emissions during the operations and maintenance phase of the Proposed Project would result in negligible long-term adverse impacts to air quality.

Decommissioning

Emissions during decommissioning associated with the Proposed Project would be similar to those described for construction. As described above, these emissions would be well below the General Conformity *de minimis* emission levels. Therefore, the Proposed Project does not require a formal General Conformity determination. Emissions during the decommissioning phase of the Proposed Project would result in minor short-term adverse impacts to air quality.

3.2.3 No Action Alternative

Under the No-Action Alternative, no construction, operations and maintenance, or decommissioning activities would occur. Existing conditions would remain the same, and therefore, no impacts to physical resources would occur.

3.3 Water Resources

The following sections contain specific information regarding the marine environment in which the Proposed Project would be sited.

3.3.1 Affected Environment

The following section describes the existing marine environment that would be potentially be affected by the Proposed Project.

3.3.1.1 Tides and Currents

Currents off the Atlantic City coast include the following: (1) the north Gulf Stream Countercurrent, which consists of cold water that is flowing slowly west to southwest; (2) near-surface currents generated by prevailing winds; (3) longshore currents generated by surf zone dynamics; (4) rip currents generated by surf zone dynamics; and (5) tidal currents in the vicinity of the inlet channels. The primary current components in open water (greater than 0.5 miles from beaches and 1 mile from the inlets) are the north Gulf Stream Countercurrent and wind-generated near surface currents. East of New Jersey, typical current velocities are approximately 0.4 to 1.1 knots.

Tides in the vicinity of Atlantic City are semi-diurnal (i.e., having two high tides and two low tides each day) and have a mean range of 4.1 feet. Although tides are one of the principal components of currents, effects of tidal fluctuations generally cannot be felt more than 1 mile offshore (NOAA 2007).

3.3.1.2 Waves

Waves off the New Jersey coast are composed of short period/wavelength local wind-generated waves superimposed on longer period/wavelength swells propagating from the open Atlantic Ocean. Winds from the west and north have a limited fetch (i.e., length of water over which a given wind has blown) for build-up of wind-generated waves, while winds out of the south and east have an unlimited fetch, and can generate large waves throughout the Project area. Instrumentation at the Coastal Marine Automated Network stations measure weather and wave characteristics, including annual mean and maximum significant wave heights. Significant wave height is defined as the average of the highest 33 percent of the observed waves. **Table 3-5** summarizes the mean and maximum significant wave heights for the two buoys located closest to the Project area. Buoy 44001 is located approximately 65 miles off of Cape May, New Jersey approximately 1.11 feet above MLLW and Buoy 44012 is located approximately 15 miles off of Five Fathom Bank, New Jersey, approximately 1.02 feet above MLLW.

Table 3-5. Mean and Maximum Significant Wave Heights (feet) Proximate to the Project Area

	Buoy 44001 (Oct 1975 – Apr 1991)		**Buoy 44012 (Oct 1986 – Nov 1992)**	
Month	**Mean**	**Max**	**Mean**	**Max**
January	5.9	17.7	3.9	27.9
February	4.9	21.7	3.6	14.8
March	5.9	19.0	3.9	17.1
April	3.3	14.1	3.9	13.8
May	3.6	9.8	3.3	10.2
June	3.3	9.2	2.6	8.5
July	3.3	9.8	2.3	7.9
August	3.6	23.0	2.6	13.1
September	3.6	10.8	3.0	13.1
October	5.9	21.0	3.6	15.4
November	4.9	25.6	3.6	15.1
December	5.6	23.3	3.9	17.4

Source: NOAA 2012.

Generally the highest wave conditions occur off the New Jersey coast from September through April, which includes a portion of the New Jersey hurricane season (typically June through November). Calmer conditions exist from May through August.

3.3.1.3 Water Quality

For the purposes of this EA, water quality is a measure of the ability of a water body to maintain the ecosystems it supports or influences. In the case of coastal and marine environments, the quality of the water is influenced by the rivers that drain into the area, the quantity and composition of wet and dry atmospheric deposition, the influx of constituents from sediments, and human activities such as discharges, run-off, dumping, air emissions, burning, and spills (Minerals Management Service [MMS] 2009).

The Project area is located within and offshore of the Great Egg Harbor Watershed (Hydrologic Unit Code [HUC] 02040302). The Atlantic Coast in this area, from Absecon to Ventor City is listed on the USEPA 303(d) list as impaired water (USEPA 2010). The causes of impairment include pesticides, organic enrichment/oxygen depletion, mercury, and PCBs. Offshore the Project area is located within the Atlantic Ocean which is a tidal, navigable waterway and is designated in the New Jersey Surface Water Quality Standards (NJSWQS) at N.J.A.C. 7:9B as a SC (C1) water, which has the following designated uses as defined at N.J.A.C. 7:9B-1.12(f):

1. Shellfish harvesting in accordance with N.J.A.C. 7:12;
2. Primary and secondary contact recreation;
3. Maintenance, migration, and propagation of the natural and established biota; and
4. Any other reasonable uses.

Per N.J.A.C. 7:7E-8.4, as required by Section 307(f) of the Federal Coastal Zone Management Act (Public Law 92-583), federal, state and local water quality requirements established under the Clean Water Act (33 US Code [USC] § 1251) shall be the water resource standards of the coastal management program. These requirements include not only the minimum requirements imposed under the Clean Water Act, but also the additional requirements adopted by states, localities, and interstate agencies pursuant to Section 510 of the Clean Water Act and such statutes as the New Jersey Water Pollution Control Act. A Section 401 Water Quality Certificate was granted for the originally Proposed Project (Permit # 0102-09-0024.2 CDT 100001) and although the Proposed Project has evolved slightly, this permit is still valid.

3.3.2 Environmental Impacts Related to Water Resources

The following section describes potential environmental consequences to water resources throughout the phases of the Proposed Project.

3.3.2.1 Tides and Currents

Due to the negligible size of the offshore Project footprint, the Proposed Project would not impact tides or currents during the construction, operations and maintenance, or decommissioning phases.

3.3.2.2 Waves

Due to the negligible size of the offshore Project footprint, the Proposed Project would not impact waves or average wave height during the construction, operations and maintenance, or decommissioning phases.

3.3.2.3 Water Quality

Construction Phase

Sediment Suspension

The installation of the turbine foundations using a pile driving hammer would result in localized suspension of bottom sediment (i.e., increase in the sediment load within the water column). The submarine cable and the offshore transition area at the nearshore jet-plow-to-HDD transition would be buried in the sediment. These activities would also result in sediment suspension. The construction of the Proposed Project would have a direct, short-term impact on water quality in discreet locations within the Project area. However, the impacts to water quality would be minimal and temporary as natural sediment build up would allow the ocean to maintain the marine ecosystems it supports. Cape Wind (2006) noted that suspension of sediment, particularly in areas where the Proposed Project would be located (i.e., characterized by coarse sand sediments) is minimal and extends out from the piling or the cable run no more than several hundred feet and exists in the water column no more than once per day.

Jet plow technology would be used for the installation of the submarine cable. This is the preferred method over mechanical dredging as it has the ability to achieve the desired burial depth with minimal environmental impacts to water quality or sensitive aquatic natural resources. In addition, it avoids the need to remove and handle sediments along the cable route which is a problem with traditional mechanical dredging and trenching techniques. The jet plow device is hydraulically powered and requires a specially designed cable laying vessel to tow it along the sea bottom. As it’s pulled forward, it fluidizes the sediment in such a way that the cable settles into the trench under its own weight to the planned depth of burial. It achieves this through the use of pressurized seawater from a water pump system on board the cable vessel and hydraulic pressure nozzles on the jet plow device that create a direct downward and backward swept flow force inside the trench which limits the upward movement of sediments into the water column and maximizes the gravitational replacement of sediments onto the cable.

Construction activities, including installation of the foundations, cables, and decommissioning activities would disturb the sea floor, with the potential to temporarily increase turbidity and total suspended solids (TSS). These activities would be of short duration, several weeks at most. Sediment grain size in the Project area is predominantly medium-coarse sand, with less than 5 percent silt/clay. Any sediments that are disturbed during construction would rapidly settle out. Consequently, adverse impacts associated with sediment suspension resulting from the Proposed Project would be minor and short-term.

Hazardous Materials and Wastes

All vessels would comply with USCG regulations for management of onboard fluids and fuels, including maintaining and implementing spill prevention plans. The likelihood of spills given these requirements is relatively low and the volume and relative area that could be impacted would be small. Such spills would be unlikely to measurably affect water quality.

Surface sediment samples show that the silt/clay component is less than 5 percent (FACW unpublished sediment data). Therefore, the ability of the sediments to retain organic carbon and associated contaminants is low. Further, the Project area is distant from potential sources of contaminants. Therefore, localized sediment disturbance is unlikely to release sediment-bound contaminants during construction.

As a result of standard directional drilling techniques from shore to seaward, the drill bit would break out of the seabed at the 15-foot contour approximately 1,800 feet from shore. There would be additional disturbance at the borehole where the 12-inch diameter HDD conduit would break out of the seabed. Anchor line sweep, anchoring, and skids on the jet plow would also temporarily disturb small additional areas of substrate. Jetting, and to a much lower degree, plowing, would result in temporary suspension of sediments, potentially causing additional benthic impacts from burial or smothering near the trench. All of these impacts would be localized and short term. At the moment of drill bit breakout, a small amount of drilling fluid would be released into the water column. Drilling fluid consists of water (95 percent) with a small amount of bentonite (5 percent), which is a naturally occurring clay, along with small amounts of environmentally-safe polymer additives, which would be selected by Professional Engineers depending upon the soils/geology encountered. After the seabed breakout of the drill bit, a back-reaming operation would take place and pullback of the 2,600 feet of high density polyethylene (HDPE) conduit pipe would be performed from a barge moored offshore at the breakout location.[7] The HDD activity in the EFH habitat would occur over a 2- to 3-day period, further reducing the risk of contamination. Consequently, adverse impacts associated with hazardous materials and wastes resulting from the Proposed Project would be minor and short-term.

Operations and Maintenance Phase

Sediment Suspension

During the operations and maintenance phase, Project-related sediment suspension would be negligible and would be largely associated with maintenance activities. Consequently, adverse impacts associated with sediment suspension resulting from the operations and maintenance phase of the Proposed Project would be negligible and short-term.

Hazardous Materials and Wastes

There would be minor amounts of lubricants and hydraulic oils associated with each of the turbines. However, most ongoing maintenance would occur inside the turbines, so the risk of a spill would be minor. Additionally, no oils or other waste would be discharged during service events. Appropriate best management practices would be implemented to provide for containment and collection of hazardous material spills should they occur. It is not expected that any painting would be necessary during the life of

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[7] 2,600 feet of HDPE conduit pipe includes 1,800 feet from the offshore transition point to the shoreline and another 800 feet from shoreline below beach and boardwalk to the vault at the terminus of Tennessee Avenue.

the turbines, other than to repair minor surface damage. The original coating system on the towers is designed to last the lifetime of the structure.

As with vessels associated with construction, all vessels used for operations and maintenance activities (approximately one per week) would comply with USCG regulations and applicable spill prevention plans and, therefore, potential impacts from spills are very unlikely.

As part of the Operations and Maintenance Plan for the operations of the turbines, an OSRP would be developed which would include the identification of a qualified Spill Responder. The Spill Responder would maintain the resources and availability necessary to address any spills. It is anticipated that development of the OSRP would be performed through close communication with the appropriate agencies such as the USCG. Therefore, potential adverse impacts associated with hazardous materials and wastes resulting from the operations and maintenance phase of the Proposed Project would be negligible and short-term.

Decommissioning

<u>Sediment Suspension</u>

The removal of the turbine foundation and submarine cable would result in sediment suspension. However, the impacts to water quality would be minimal and temporary as natural sediment accretion would allow the ocean to maintain the marine ecosystems it supports. Adverse impacts associated with sediment suspension resulting from the decommissioning phase of the Proposed Project would be minor and short-term.

<u>Hazardous Materials and Wastes</u>

Fuel spills or leaks from vessels and deconstruction equipment could also occur but would be unlikely due to secondary containment systems and spill response plans. Further, potential minor fuel spills or leaks would not measurably affect water quality due to the relatively small volume of fuel carried aboard vessels or equipment involved in decommissioning. Potential adverse impacts associated with hazardous materials and wastes resulting from the decommissioning phase of the Proposed Project would be minor and short-term.

3.3.3 No Action Alternative

Under the No-Action Alternative, no construction, operations and maintenance, or decommissioning activities would occur. Existing conditions would remain the same, and therefore, no impacts to water resources would occur.

3.4 Biological Resources

The following sections contain specific information regarding the biological resources in and around the Project area. Biological resources have been documented in the Project area during two different survey efforts. As part of the permitting process, FACW conducted a series of pre-construction surveys beginning in May 2010 and continuing into May 2011 (GeoMarine, Inc. [GMI] and Curry & Kerlinger 2011). The pre-construction program provided site specific data that would supplement the 23-month NJDEP Ocean/Wind Power Ecological Baseline Studies (NJDEP EBS) previously conducted by GMI off New Jersey in 2008 and 2009 (GMI 2010). The final report of these studies is available at http://www.nj.gov/dep/dsr/ocean-wind/. Additional studies used to inform the biological resources impact analysis include the following studies and survey efforts:

- *Aquatic Resources Impact Assessment 20 MW Offshore Wind Energy Project Offshore of Atlantic County, New Jersey* (AMEC 2009)
- *Revised Marine Mammal and Sea Turtle Risk Assessment 20 MW Offshore Wind Energy Project* (AMEC 2011)
- *Ocean/Wind Ecological Baseline Studies, Final Report, Volume II: Avian Studies* (GMI 2010)
- *Avian, Sea Turtle, and Marine Mammal Summary Data May 2010-May 2011* (GMI and Curry & Kerlinger 2011)
- *Essential Fish Habitat Assessment for the Fishermen's Atlantic Offshore Windfarm, LLC Proposed Six Turbine New Jersey State Waters Offshore Wind Project 2.8 Miles Off of Atlantic City, New Jersey (*Normandeau 2011a)
- *Fishermen's Energy 20MW Offshore Wind Energy Project: Benthic Macroinvertebrate Report (*Normandeau 2011b)
- *The Use of Aerial Platform Monitoring to Document Offshore Bat Migration for the Fisherman's Atlantic City Windfarm Development Project Interim Report for the Spring* (NEES and GMI 2011)
- *Pre-Construction Monitoring of Offshore Bat Migration for the Fishermen's Atlantic City Windfarm Development Project* (NEES and GMI 2013)

3.4.1 Affected Environment

The description of biological resources provided below does not include a description of wetlands, vegetation, or terrestrial mammals. Per CEQ guidelines resources that are anticipated to experience either no impact or negligible environmental impact under implementation of the Proposed Project are not examined in detail, but described above in **Section 3.1**.

3.4.1.1 Marine Mammals and Sea Turtles

Marine mammals include whales, dolphins, porpoises, and seals. The following section describes marine mammals and sea turtles that are known to occur or could potentially occur in the Project area. These data were primarily derived from pre-construction surveys performed by FACW and the NJDEP EBS (**Figure 10**; AMEC 2011; GMI 2010; GMI and Curry and Kerlinger 2011).

Methods used to determine presence of marine mammals and sea turtles were similar to those approved by the NJDEP and used in the NJDEP EBS (GMI 2010). Transects followed a grid beginning just offshore to approximately 5 nautical miles, with the sampling area including approximately 985 feet off the side of the boat. By May 2011 approximately 61 miles of transects were logged, from which data on marine mammals, and sea turtles were compared to data from approximately 380 miles of transects logged by NJDEP EBS (GMI 2010).

Marine Mammals

All marine mammal species are protected by the Marine Mammal Protection Act of 1972, as amended in 1994 (MMPA). The MMPA prohibits the take of marine mammals, which is defined as the harassment, hunting, or capturing of marine mammals, of the attempt thereof. Harassment is further defined as any act of pursuit, annoyance, or torment and is classified as Level A (potentially injurious to a marine mammal or marine mammal stock in the wild) and Level B (potentially disturbing a marine mammal or marine mammal stock in the wild by causing disruption to behavioral patterns). Activities, such as pile driving or the use of vessels with dynamic positioning thrusters, have the potential to cause harassment as defined by the MMPA.

Forty-two marine mammal species have confirmed occurrences or potential for occurrence in the marine waters off the coast of New Jersey (GMI 2010). Of these 42, only 20 occur as a regular or normal part of the fauna in the northeast Atlantic Ocean and would be likely to be found in the Project area (see **Table 3-6**; AMEC 2011).

Based on the results of FACW pre-construction surveys and the NJDEP EBS, the bottlenose dolphin (*Tursiops truncatus*) was the most commonly observed species, with over 280 individuals documented. Additionally, the pre-construction surveys recorded two fin whales (*Balaenoptera physalus*) and two humpback whales (*Megaptera novaeangliae*) as well as one to four harbor seals (*Phoca vitulina*), minke whales (*Balaenoptera acutorostrata*), and harbor porpoises (*Phocoena phocoena*) (GMI and Curry & Kerlinger 2011). Although no pattern was discernible among whales with respect to distribution in relation to the shoreline, dolphin abundance appeared to increase from the shore outward with most observations between 3 and 5 nautical miles from shore (**Figure 10**; GMI and Curry & Kerlinger 2011). Descriptions of federally listed marine mammals known to occur in the Project area have been provided below.

Fin Whale

The fin whale was listed as federally endangered in 1970. The best abundance estimate for fin whales in the western North Atlantic is 3,985 individuals (Waring et al. 2011). Present threats to fin whales are similar to those that threaten other whale species, namely fishery entanglements and vessel strikes. Fin whales seem less likely to become entangled than other whale species. Glass et al. (2008) reported that between 2002 and 2006, fin whales belonging to the Gulf of Maine population were involved in eight confirmed entanglements with fishery equipment. On the other hand, vessel strikes may be a more serious threat to fin whales. Glass et al. (2008) reported eight vessel strikes, while Nelson et al. (2007) reported ten strikes. NOAA data indicate that nine fin whales were confirmed killed by collisions from 2005 through 2009 (Waring et al. 2011). A study compiling whale/vessel strike reports from historical accounts, recent whale strandings, and anecdotal records by Laist et al. (2001) reported that, of the 11 great whale species studied, fin whales were involved in collisions most frequently.

The range of fin whales in the North Atlantic extends from the Gulf of Mexico, the Caribbean Sea, and the Mediterranean Sea in the south to Greenland, Iceland, and Norway in the north. They are the most commonly sighted large whales in continental shelf-waters from the mid-Atlantic coast of the US to Nova Scotia, principally from Cape Hatteras northward (Sergeant 1977; Sutcliffe and Brodie 1977; Cetacean and Turtle Assessment Program 1981; Hain et al. 1992; Waring et al. 2011). Fin whales, much like humpback whales, seem to exhibit habitat fidelity to feeding areas (Waring et al. 2011; Kenney and Vigness-Raposa 2010). While fin whales typically feed in the Gulf of Maine and the waters surrounding New England, mating and calving (and general wintering) areas are largely unknown (Waring et al. 2011). Strandings data indicate that calving may take place in the mid-Atlantic region during October to January (Hain et al. 1992).

Fin whales are present in the mid-Atlantic region during all four seasons, although sightings data indicate that they are more prevalent during winter, spring, and summer (Waring et al. 2012).

Humpback Whale

The humpback whale was listed as endangered in 1970 due to population decrease resulting from overharvesting. The humpback whale population within the western North Atlantic has been estimated to include approximately 4,894 males and 2,804 females, with an ocean basin-wide estimate of approximately 11,570 individuals (Waring et al. 2013). According to the species stock assessment report, the best estimate of abundance for the Gulf of Maine stock of humpback whales is 823 individuals (Waring et al. 2013).

A majority of female humpback whales migrate from the North Atlantic to the Caribbean in winter, where calves are born between January and March (Blaylock et al. 1995). Not all humpback whales migrate to the Caribbean during winter, and numbers of this species are sighted in mid- to high-latitude areas during winter (Clapham et al. 1993; Swingle et al. 1993). The mid-Atlantic area may also serve as important habitat for juvenile humpback whales, evidenced by increased levels of juvenile strandings along the Virginia and North Carolina coasts (Wiley et al. 1995).

Contemporary human threats to humpback whales include fishery entanglements and vessel strikes. Glass et al. (2008) reported that between 2002 and 2006, humpback whales belonging to the Gulf of Maine population, were involved in 77 confirmed entanglements with fishery equipment and nine confirmed ship strikes. Humpback whales that were entangled exhibited the highest number of serious injury events of the six species of whale studied by Glass et al. (2008). The minimum annual rate of anthropogenic mortality and serious injury to humpback whales occupying the Gulf of Maine was 4.2 individuals per year (Nelson et al. 2007). NOAA records for 2006 through 2010 indicate ten reports of mortalities as a result of collisions with vessels and 29 serious injuries and mortalities attributed to entanglements (Waring et al. 2013).

Humpback whales exhibit consistent fidelity to feeding areas within the northern hemisphere (Stevick and Pacheco de Godoy 2006), effectively creating six subpopulations that feed in six different areas during spring, summer, and fall. These populations can be found in the Gulf of Maine, the Gulf of St. Lawrence, Newfoundland/Labrador, western Greenland, Iceland, and Norway (Waring et al. 2013). Humpback whales migrate from these feeding areas to the West Indies (including the Antilles, the Dominican Republic, the Virgin Islands and Puerto Rico) where they mate and calve (NMFS 1991; Waring et al. 2013). While migrating, humpback whales utilize the mid-Atlantic as a migration pathway between calving/mating grounds to the south and feeding grounds in the north (Waring et al. 2013). Humpbacks typically occur within the mid-Atlantic region during fall, winter, and spring months (Waring et al. 2012). Therefore, humpback whales have the potential to occur in the Project area during these seasons.

North Atlantic Right Whale

The North Atlantic right whale was listed as a federal endangered species in 1970. When the right whale was protected in the 1930s, it is believed that the North Atlantic right whale population was roughly 100 individuals. In 2009, the Western North Atlantic population size was estimated to be at least 444 individuals (Waring et al. 2013).

The North Atlantic right whale was the first species targeted during commercial whaling operations and was the first species to be greatly depleted as a result (Kenney 2002). Contemporary human threats to North Atlantic right whale populations include fishery entanglements and vessel strikes, along with habitat loss, pollution, anthropogenic noise, and intense commercial fishing (Kenney 2002). Ship strikes of individuals can impact North Atlantic right whales on a population level due to the intrinsically small remnant population that persists in the North Atlantic (Laist et al. 2001). Between 2002 and 2006, a study of marine mammal strandings and human-induced interactions reported that North Atlantic right whales in the western Atlantic were subject to the highest proportion of entanglements (25 of 145 confirmed events) and ship strikes (16 of 43 confirmed occurrences) of any marine mammal studied (Glass et al. 2008). From 2006 through 2010, nine of 15 records of mortality or serious injury to North Atlantic right whales involved entanglement or fishery interactions (Waring et al. 2013). The NOAA marine mammal stock assessment for 2012 reports that the low annual reproductive rate of North Atlantic right whale, coupled with a small population size, suggests human-caused mortality may have a greater impact on population growth rates for this species than for other whales (Waring et al. 2013).

Similar to the other whale species described, North Atlantic right whales have the potential to traverse the Project area. To address the potential for ship strikes, NOAA designated segments of the near-shore waters of the mid-Atlantic Bight as mid-Atlantic seasonal management areas for right whales. NMFS requires that all vessels 65 feet or longer must travel at 10 knots or less within the right whale seasonal management areas from November 1 through April 30, when North Atlantic right whales are most likely to pass through these waters.

Sea Turtles

Five sea turtle species have confirmed or potential occurrences in the marine waters off the coast of New Jersey (GMI 2010). Of those species, only the loggerhead turtle (*Caretta caretta*) and the leatherback turtle (*Dermochelys coriacea*) have been observed within the vicinity of the Project area (AMEC 2009; GMI 2009). However, based on the results of pre-construction surveys and the NJDEP EBS, just one single loggerhead turtle (*Caretta caretta*) sighting was recorded near the center of the Project area in 2010 and

2011 (**Figure 10**; GMI 2010; GMI and Curry & Kerlinger 2011). Descriptions of federally listed sea turtles known to occur in the Project area have been provided below.

Loggerhead Turtle

The loggerhead sea turtle was federally listed as threatened in 1978. Threats to the loggerhead sea turtle include both naturally caused and anthropogenic destruction and alteration of nesting habitats, marine debris, coastal noise and light pollution, beach vehicle traffic, boat strikes, and fishery incidents (Turtle Expert Working Group 2000; NMFS and USFWS 2007a).

In the Atlantic, the loggerhead turtle's range extends from Newfoundland to as far south as Argentina. During the summer, nesting occurs primarily in the subtropics. Although the major nesting concentrations in the US are found from North Carolina through southwest Florida, minimal nesting occurs outside of this range westward to Texas and northward to Virginia. Adult loggerheads are known to make extensive migrations between foraging areas and nesting beaches. During non-nesting years, adult females from US beaches are distributed in waters off the eastern US and throughout the Gulf of Mexico, Bahamas, Greater Antilles, and Yucatán (NOAA 2014b).

Loggerhead sea turtles were observed during the FAWC surveys and are known to occur within the Project area.

Leatherback Turtle

The leatherback sea turtle was federally listed as endangered in 1970. Most threats to this species are anthropogenic and include: (1) coastal tourism, (2) habitat alteration and loss, (3) artificial lighting on breeding beaches, (4) pollution, (5) global warming, (6) and ingestion of marine debris (e.g., balloons). However, vessel strikes and commercial fishing are the largest threats to this species (NMFS and USFWS, 2007b; Turtle Expert Working Group 2007; NMFS and USFWS 1992).

Adult leatherbacks are capable of tolerating a wide range of water temperatures and have been sighted along the entire continental east coast of the US as far north as the Gulf of Maine and south to Puerto Rico, the US Virgin Islands, and into the Gulf of Mexico (NOAA 2014a). Nesting occurs within tropical and subtropical climates, and the only nest colonies in continental US are in Florida. While sightings of leatherback sea turtles off the coast of New Jersey are likely transient migrating individuals, leatherback turtles were observed during the FAWC surveys and are known to occur within the Project area.

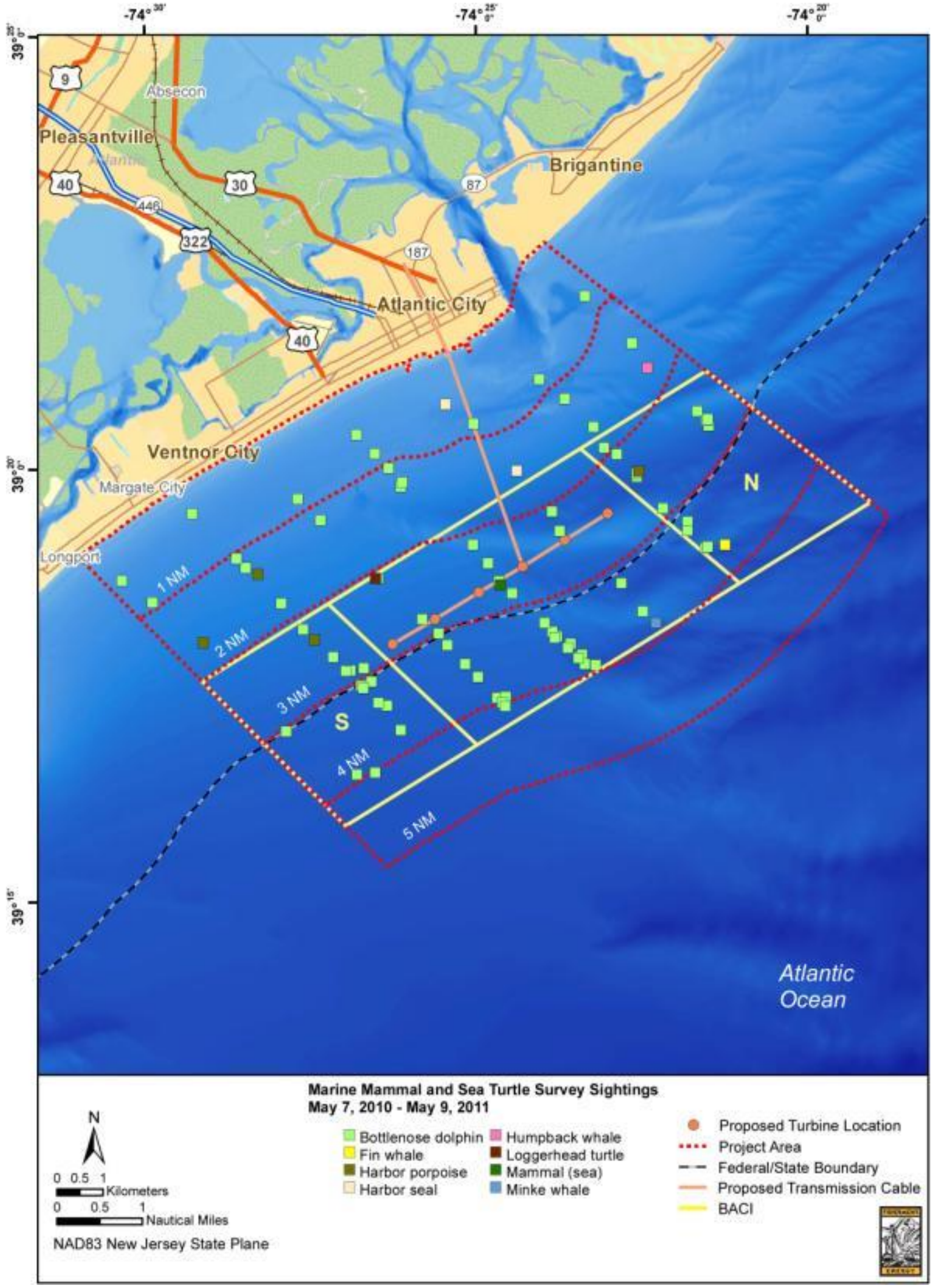

Figure 10. Marine mammals and sea turtles documented in the vicinity of the Proposed Project (from GMI and Curry & Kerlinger 2011).

Table 3-6. Marine Mammals and Sea Turtles Potentially Occurring in the Project Area					
Common Name	**Scientific Name**	**NJ State Conservation Status**	**Time of Year Observed/Expected**	**Potentially Present in Project Area**	**Observed Within EBS Study Area**
Whales					
Fin whale	*Balaenoptera physalus*	FE	Year round	Possible	✓
Humpback whale	*Megaptera novaeangliae*	FE	Year round	Possible	✓
Minke whale	*Balaenoptera acutorostrata*	LC	Winter/Summer	Possible	✓
North Atlantic right whale	*Eubalaena glacialis*	FE	Year round	Possible	✓
Sei whale	*Balaenoptera borealis*	FE	N/A	Uncommon	
Dolphins					
Atlantic spotted dolphin	*Stenella frontalis*	U	N/A	Uncommon	
Atlantic white-sided dolphin	*Lagenorhynchus acutus*	LC	N/A	Uncommon	
Bottlenose dolphin	*Tursiops truncatus*	LC	May-August	Possible	✓
Common dolphin	*Delphinus delphis*	LC	November-March	Possible	✓
Harbor porpoise	*Phocoena phocoena*	LC	Fall-Spring	Possible	✓
Long-finned pilot whale	*Globicephala melas*	U	N/A	Uncommon	
Risso’s dolphin	*Grampus griseus*	LC	N/A	Uncommon	
Short-finned pilot whale	*Globicephala macrorhynchus*	U	N/A	Uncommon	
Seals					
Gray seal	*Halichoerus grypus*	LC	N/A	Possible	
Harbor seal	*Phoca vitulina*	LC	Year round	Possible	✓
Sea Turtles					
Green turtle	*Chelonia mydas*	FE	May-November	Possible	
Hawksbill turtle	*Eretmochelys imbricata*	FE	Spring-Summer	Uncommon	
Kemp’s ridley	*Lepidochlelys kempi*	FT	May-November	Possible	
Leatherback turtle	*Dermochelys coriacea*	FE	May-November	Possible	✓
Loggerhead turtle	*Caretta caretta*	FE	Summer/Fall	Possible	✓

Sources: AMEC 2011; NJDEP 2010, 2012b; USFWS 2014a.
Notes: FE = Federally Endangered; FT = Federally Threatened; U = Undetermined; LC = Least Concern

3.4.1.2 Birds and Bats

The following section describes bird and bat species that have been documented to inhabit the Project area. These data were primarily derived from pre-construction surveys performed by FACW and the NJDEP EBS (**Figure 11**; GMI 2010; GMI and Curry & Kerlinger 2011).

Birds

Migratory Birds

Despite the level of human development and activity present, mid-Atlantic Coast plays an important role in the ecology of many bird species. The Atlantic Flyway, which encompasses all of the areas that could be potentially affected by the Proposed Project, is a major route for migratory birds, which are protected under the Migratory Bird Treaty Act of 1918 (MBTA).

The official list of migratory birds protected under the MBTA, and the international treaties that the MBTA implements, is found at 50 CFR Part 10.13. The MBTA makes it illegal to "take" migratory birds, their eggs, feathers, or nests. Under Section 3 of Executive Order 13186, DOE and USFWS established a Memorandum of Understanding (MOU) on September 12, 2013, which identifies specific areas in which cooperation between the agencies would substantially contribute to the conservation and management of migratory birds and their habitats. The purpose of the MOU is to strengthen migratory bird conservation through enhanced collaboration between the agencies. One of the underlying tenets identified in the MOU is to evaluate potential impacts to migratory birds and design or implement measures to avoid, minimize, and mitigate such impacts as appropriate.

Bald Eagles and Golden Eagles

The Bald and Golden Eagle Protection Act (BGEPA) of 1940, as amended (16 USC § 668-668d) prohibits the "take" and trade of bald and golden eagles. However, golden eagles are not expected to occur within or adjacent to the Project area. Thus, the Project would have no effect on golden eagles. Bald eagles occur near wetlands such as seacoasts, rivers, large lakes, or marshes but not in the open ocean, thus the marine portion of the Project would have no effect on bald eagles. No bald eagles were documented in any of the avian surveys associated with the Proposed Project.

Project Area Surveys

Using the same transects as described for marine mammals and sea turtles above, FACW conducted surveys during 2010 – 2012 on bird abundance and behavior. During the 2010-2011 surveys, 22,491 individual bird sightings of 65 species were recorded (GMI and Curry & Kerlinger 2011). The most common species were northern gannet (*Morus bassanus*), scoters, cormorants, gulls, and loons. Northern gannet was the most numerous species (20.4 percent of all sightings), although the three species of scoters accounted for 33.6 percent of all bird sightings. Gulls and terns accounted for 26.5 percent of all birds, whereas cormorants accounted for 9.5 percent of all birds. Together these four species groups accounted for 90 percent of all birds detected. There were few shearwaters, pelicans, grebes, storm-petrels, herons, jaegers, shorebirds, alcids, raptors, or songbirds that were detected during the surveys. Comparisons between the 2010-2011 and the 2008-2009 NJDEP EBS data revealed similar species composition and abundances across years. However, seasonal data demonstrated the greatest abundance and number of species during fall when a variety of species migrated through the Project area.

Special effort was taken to determine whether federally threatened piping plovers (*Charadrius melodus*) and red knots (*Calidris canutus*), and federally endangered roseate terns (*Sterna dougallii*) were present in the Project area. Between 2008 and 2011, no federally endangered or threatened species, candidate species, or species proposed for listing were observed (GMI 2010; GMI and Curry & Kerlinger 2011). Additionally, no federally designated critical habitat for federally listed bird species occurs within the Project area (USFWS 2014b). However, during these years, three state-listed species were observed including 14 least terns (*Sternula antilla*rum) (state endangered); 49 osprey (*Pandion haliaetus*) (state threatened), and seven peregrine falcons (*Falco peregrinus*) (state threatened). None of the peregrine falcons or least terns were observed within 0.60 miles of the turbine locations and only one of the 39 recorded ospreys was observed within approximately 0.60 miles (**Figure 11**).

The gradient analyses for most species revealed a declining trend in abundance going offshore (i.e., away from the shoreline) (GMI and Curry & Kerlinger 2011). Peak abundances of scoters, gulls, terns, and of all birds combined were within 2 nautical miles of shore, with fewer birds from 2 nautical miles outward. However, more northern gannets were observed beyond 1 nautical mile from the beach and there was great variability in abundance of this species with respect to distance from shore and among years. Similarly, loon abundances were extremely variable with distance from the shoreline. No species or group was consistently observed in greatest abundances 2 to 3 nautical miles from shore, the area where turbines would be located. Instead, they were either much closer to shore or spread over 2 to 5 nautical miles from shore.

Within the study area as a whole, extending 5 nautical miles from shore, the vast majority (i.e., 86.3 percent) of birds observed flying during the 2010-2011 study were below the Rotor Swept Zone (RSZ) (i.e., the airspace through which the turbine blades spin is called the rotor swept zone), whereas only 0.1 percent flew higher than the height of the rotors. This pattern is consistent with that reported for the NJDEP EBS, so it is likely that variability among years is minimal. In 2010-2011, 13.2 percent of flying birds were within the RSZ, whereas in 2008-2009, 1.8 percent and 0.7 percent flew at this height.

Only a small number and percentage of the birds that were observed within the 2 to 3 nautical miles from shore distance band (i.e., the location for the proposed turbines) were flying at the height of turbine rotors. Of 11,972 bird sightings in this distance band during 2008-2009 and 2010-2011, only 6.7 percent were flying in the RSZ. These birds were mostly gulls, for which 12.1 percent of 1,789 birds were in the RSZ. For terns, scoters, gannets, and loons, the percentage ranged between 0.0 percent in the case of terns and 2.7 percent for gannets. However, cormorants, Canada geese, and Bonaparte’s gulls flew more often in the RSZ.

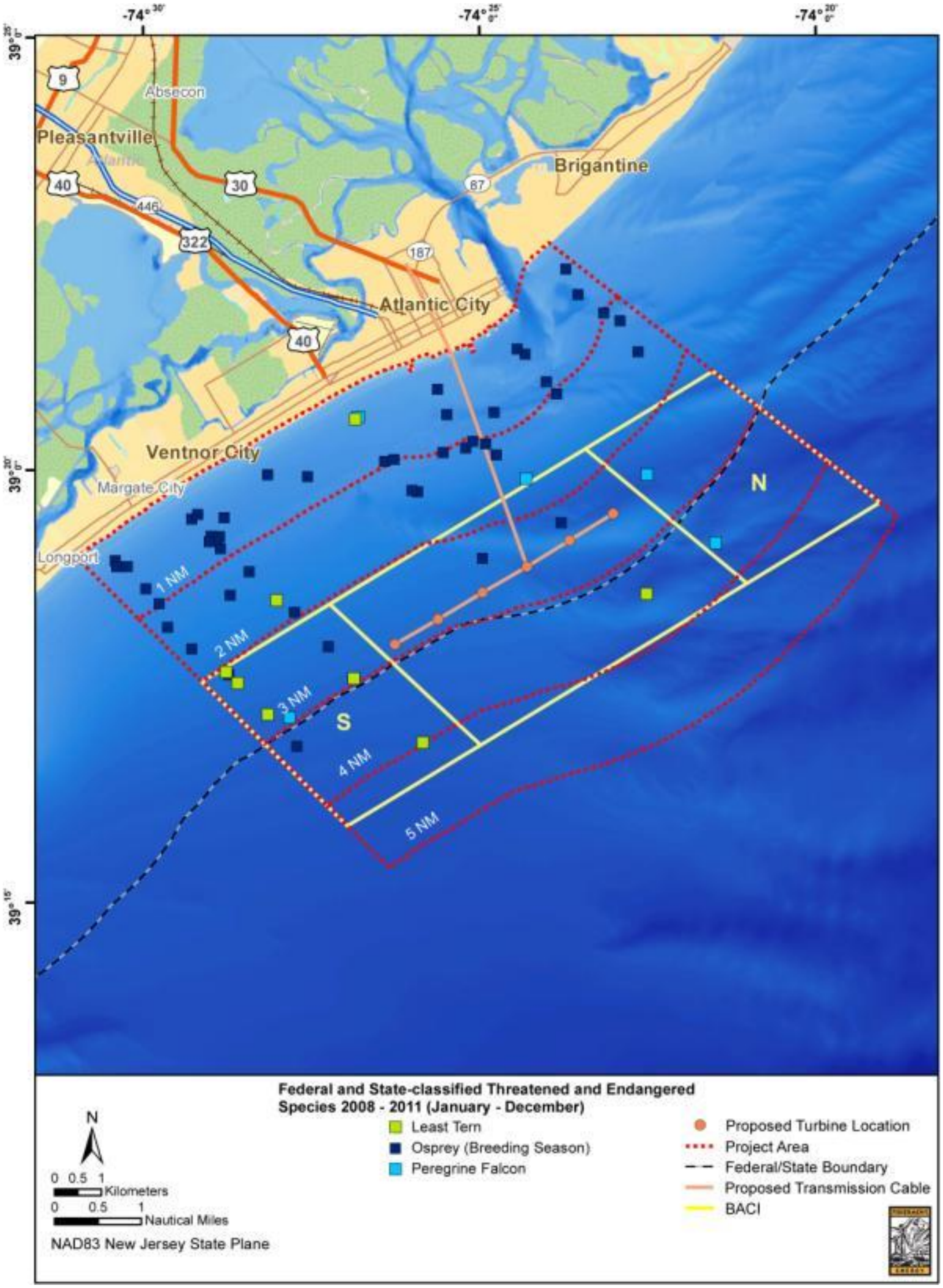

Figure 11. Federal and state-listed birds documented in the vicinity of the Proposed Project (BACI refers to the entire area surveyed in compliance with NJDEP Permit requirements; from GMI and Curry & Kerlinger 2011).

The proposed turbines occupy only a very small portion of the area from 2 to 3 nautical miles from shore. The six turbines and the area between the turbines out to the length of one blade would occupy only 3.2 percent of the area within the 2 to 3 nautical miles from shore distance band within the Project area. Consequently, a small number and percentage of birds would be expected within the turbine area.

The number of birds that would likely be flying within the RSZ at 2 to 3 nautical miles from shore is small. This is derived from the 2,075 individuals observed between 2 to 3 nautical miles from shore and the 56 observed within the RSZ. Because the turbine area (including rotor diameter and distance between turbines) accounts for 3.2 percent of the 2 to 3 nautical miles offshore between Longport and Brigantine, the number of gannets, for example, likely flying within the RSZ at this distance from shore would have been about 1.79 birds. Similar estimates have been made for other species.

The most important findings of these studies include:

(i) Large numbers of birds do not congregate, forage or spend extended periods of time within the area where turbines would be located;

(ii) Bird abundance generally decreases with distance from shore and highest abundances of most species are found within 2 nautical miles of the beach;

(iii) Very few birds were observed flying at rotor swept zone in any portion of the study area and a vast majority were observed flying within 100 feet of the water. Because the turbines occupy only about 3.2 percent of the two dimensional area between 2 and 3 nautical miles from shore between Longport and Brigantine, the percentage of birds flying at rotor swept zone (i.e., 100 to 500 feet above the water) within the turbine area was minimal.

(iv) Federally-listed species reported by the USFWS to have the potential to occur in the Project area were not recorded during the years of observations. These species include the federally endangered roseate tern (*Sterna dougallii*), and federally threatened piping plover (*Charadrius melodus*) and red knot (*Calidris canutus*).

(v) Three New Jersey-listed species (state threatened peregrine falcon and osprey and state endangered least tern) were found in very small numbers within the FACW survey area. No falcons or terns, and only one osprey, was observed within 0.6 miles of the proposed turbine locations.

Bats

The federally endangered Indiana bat (*Myotis sodalis*) and the federally threatened northern long-eared bat (*Myotis septentrionalis*) are known to occur in New Jersey. Indiana bats are not known to occur in Atlantic County; however, northern long-eared bat maternity colonies have been identified within Absecon City, Egg Harbor Township, Galloway Township, Hamilton Township, and Pleasantville City (USFWS 2014d). No federally designated critical habitat occurs within the Project area for either of these species (USFWS 2014b).

In August 2009, North East Ecological Services (NEES) was contracted to produce a desktop environmental impact analysis on bats for the FACW. This report highlighted the lack of research on migratory bat behavior across large bodies of water or along coastal corridors, and suggested that this was primarily the result of the technical inability to monitor bat movements over water, particular at high altitude (NEES 2009). In the report, NEES highlighted anecdotal data on offshore bat migration from the historic literature and produced a map identifying the location of all known offshore bat sightings since 1891. Although all of these sightings were north or east of the Project area, they suggested the possibility that migratory bats could travel across the Project area as they migrated south through the Atlantic coastal region.

During the 2011 spring and fall migratory seasons FACW contracted NEES to conduct transect surveys to monitor bat activity in the Project area (NEES and GMI 2011). In addition to the boat transects conducted during the spring monitoring season, NEES conducted one blimp survey in June 2011. The blimp survey used a modified transect to maximize the period when the acoustic monitors were parallel to the coastline. Only four bat calls were recorded and all the bats were heard west of the Project area in the transect route that ran perpendicular to the coastline.

Based on these results, NEES continued monitoring bat activity during the fall migration. NEES completed four surveys in August, documenting seven bat calls during two of these surveys (NEES and GMI 2011, 2013). Of the seven calls recorded, only two were located in close proximity to the proposed turbine locations (approximately 0.50 miles away). One of these was a silver-haired bat (*Lasionycteris noctivagans*) and the other was unidentified. The other five recorded calls were more than 1 mile away from the proposed turbine locations and were identified as hoary bats (*Lasiurus cinereus*) and eastern red bats (*Lasiurus borealis*).

During the spring 2012 migratory season, a total of five blimp transects were conducted across the Project site between May and June (NEES and GMI 2013). Only one eastern red bat was recorded across all five sampling periods (NEES and GMI 2013). These data were similar to the ship-based transects of the spring 2011 migratory season in three major respects. First, both spring migratory sampling periods detected relatively low levels of bat activity. Second, all the bats detected during the spring migratory surveys, across ten different survey dates, were documented in the same area, approximately 1 to 1.5 miles directly offshore of Margate City. Third, all of the bats documented in the spring migratory period were documented within a 10-day period at the end of May (NEES and GMI 2013).

3.4.1.3 Fisheries

The following sections describe fish and shellfish species that have been documented to inhabit the Project area. These data were primarily derived from pre-construction surveys performed by FACW and the NJDEP EBS (Normandeau 2011a; GMI 2010). The waters off the coast of New Jersey are rich in sport fish and non-game fish, both migratory and non-migratory. The coastal beaches and surf zone are particularly important habitat. Studies conducted off northern New Jersey report 57 species representing 30 families (Wilber et al. 2003). Shoreface sand ridges (e.g., Beach Haven Ridge off Little Egg Inlet) have higher abundance and species richness compared to surrounding inner Continental Shelf (Vasslides and Able 2008). The pelagic zone (that being neither near the bottom of the ocean nor close to the shoreline) within the Project area contains large schools of herring and fast-swimming oceanic wanderers such as large predatory fish. Sand and sand-mud plains in the Project area typically contain demersal zone (that being on or near the sea floor), solitary fish.

There are five fish species of concern and one federally threatened species found within or in the vicinity of the Project area. The five species of concern include alewife (*Alosa pseudoharengus*), blueback herring (*Alosa aestivalis*), barndoor skate (*Dipturus laevis)*, dusky shark (*Carcharhinus obscurus*), and sand tiger shark (*Carcharius Taurus*). The federally threatened species is the Atlantic sturgeon (*Acipenser oxyrhynchus*), which migrates along the Atlantic Coast.

Essential Fish Habitat

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) requires fishery management councils to: (1) describe and identify EFH in their respective regions; (2) specify actions to conserve and enhance that EFH; and (3) minimize the adverse effects of fishing on EFH. The Magnuson-Stevens Act, as amended by the Sustainable Fisheries Act 1996 (Public Law 104-267), requires all federal agencies to consult with NMFS on all actions, or proposed actions, permitted, funded, or undertaken by the agency that may adversely affect EFH designated in fishery management plans. The fishery management councils identify habitat areas of particular concern (HAPCs) within fishery management plans. HAPCs are discrete subsets of EFH that provide extremely important ecological functions or are especially vulnerable to degradation.

Fish could be impacted by underwater noise. Sublethal effects include behavioral effects such as feeding, schooling, and reproduction; soft tissue impacts; hearing loss; visual impairment, and other physiological conditions. The degree to which a fish is impacted by noise is dependent on several factors. These can include both the species and life stage of fish as well as environmental factors such as water depth, hydrodynamic regime, and substrate type. The absence of a swimbladder (including all cartilaginous fish such as sharks, skates, and rays) reduces the vulnerability to sound and sound pressure effects. Smaller fish are more likely to be affected by underwater sound than larger fish. Eggs and larvae are unable to avoid sound effects, they are therefore potentially more vulnerable. FACW performed an EFH Assessment (Normandeau 2011a) for the Project area (refer to **Section 2.5.2.2** for a discussion of NMFS consultation associated with EFH). A list of the 26 species which have designated EFH or commercial importance in the Project area is presented in **Table 3-7**. Potential impacts to these species resulting from construction, operations and maintenance, and decommissioning of the Proposed Project are presented in **Section 3.4.2.3**.

Table 3-7. EFH Species Analyzed for the Proposed Project

Common Name	Scientific Name	Eggs	Larvae	Juveniles	Adults
Atlantic cod	*Gadus morhua*				✓
Atlantic butterfish	*Peprilus triacanthus*			✓	
Atlantic sea herring	*Clupea harengus*			✓	✓
Black sea bass	*Centropristus striata*	N/A		✓	✓
Bluefin tuna	*Thunnus thynnus*			✓	
Bluefish	*Pomatomus saltatrix*	✓		✓	✓
Clearnose skate	*Raja eglanteria*			✓	✓
Cobia	*Rachycentron canadum*	✓	✓	✓	✓
Dusky shark	*Charcharinus obscurus*		✓		
King mackerel	*Scomberomorus cavalla*	✓	✓	✓	✓
Little skate	*Raja erinacea*			✓	✓
Monkfish	*Lophius americanus*	✓	✓		✓
Red hake	*Urophycis chuss*	✓	✓	✓	✓
Sandbar shark	*Charcharinus plumbeus*		✓/HAPC	✓/HAPC	✓/HAPC
Scup	*Stenotomus chrysops*	N/A	N/A	✓	✓
Shortfin mako shark	*Isurus oxyrhyncus*			✓	
Spanish mackerel	*Scomberomorus maculatus*	✓	✓	✓	✓
Spiny dogfish	*Squalus acanthias*	N/A	N/A		✓
Summer flounder	*Paralicthys dentatus*	✓	✓	✓	✓
Surf clam	*Spisula solidissima*	N/A	N/A	✓	✓
Tiger shark	*Galeocerdo cuvieri*		✓	✓	
Windowpane flounder	*Scopthalmus aquosus*	✓	✓	✓	✓
Winter flounder	*Pseudopleuronectes americanus*	✓	✓	✓	✓
Winter skate	*Leucoraja ocellata*			✓	✓
Witch flounder	*Glyptocephalus cynoglossus*	✓			
Yellowtail flounder	*Limanda ferruginea*	✓	✓		

The notation "✓" indicates that EFH has been designated within the square for a given species and life stage. The notation "N/A" indicates species that either have no data available on the designated lifestage, or that lifestage is not present in the species reproductive cycle.
The notation “HAPC” indicates habitat areas of particular concern, which is EFH that has been judged to be particularly important to the long-term productivity of populations of one or more managed species, or to be particularly vulnerable to degradation.
Source: Normandeau 2011a and NMFS, “Guide to Essential Fish Habitat Designations in the Northeastern United States for Marine Waters.”

3.4.1.4 Benthos

Boesch (1979) categorized the benthic habitat (i.e., the lowest level of a body of water, including the sediment surface and some sub-surface layers) in an area located just north of the Project area. This area was described as inner shelf coarse substrate, characterized by dynamic, uniformly coarse sand containing a benthic community dominated by mollusks (*Tellina agilis*), crustaceans (*Tanaissus liljeborgi*), a variety of polychaetes, and the sand dollar *Echinaachnius parma.* Changes in dominant species were related to changes in subtle bottom topography, especially ridge and swale topography.

BOEM and USACE have both conducted studies in the general area to evaluate the feasibility of sand borrowing or harvesting. Byrnes and Hammer (2001) conducted benthic surveys in May and September 1998 for six borrow areas off southern New Jersey including an area just north of Absecon Inlet located approximately 2.75 miles northeast of proposed Turbine 6 of the FACW Project. This area in the Proposed Project vicinity was a predominantly sandy habitat with a benthic community dominated by polychaete worms (*Polygordius* sp. and *Capitella capitata*) and Atlantic nut clams (*Nucela proxima*) in May and polychaete worms (*Polygordius* sp., *Apoprionospio pygmaea*, and *Asabellides oculata*) in September.

Versar, Inc. (2010) found that the benthic communities in the Project vicinity were typical of mid-Atlantic inner continental shelf sand community and were largely determined by sediment regime. The fine sand areas in the Project vicinity were typically dominated by amphipods (*Protohaustorius wigleyi* and *Acanthohaustorius similis*) and polychaete worms (*Apoprionospio pygmaea* and *Polygordius jouinae*). The medium sand areas were characterized by the absence of amphipods (*Protohaustorius wigleyi* and *Acanthohaustorius similis*) and polychaete worms (*Apoprionospio pygmaea*), while the polychaete worm (*Polygordius jouinae*) was the dominant species. High silt clay areas were dominated by polychaete worms (*Apoprionospio pygmaea* and *Amastigos caperatus*).

In November 2010, Normandeau (2011b) conducted benthic invertebrate sampling at each turbine location as part of the development of the EFH assessment. The total macrofaunal abundance ranged from approximately 24 to 629 organisms per square foot. The number of unique taxa ranged from nine to 37. The dominant species included a mix of polychaetes, amphipods, and bivalve mollusks (Normandeau 2011b).

3.4.2 Environmental Impacts Related to Biological Resources

Data from the biological studies conducted within the Project area were used to assess potential risk posed by the Proposed Project to biological resources in the nearshore waters at and near the Project area. Ultimately, these pre-construction data would be used to compare abundance, distribution, and behavioral data of biological resources that would be collected during construction and post-construction phases of the Project (refer to **Section 2.6.6** and **Appendix B** for Post-Construction Work Plan and Post-Construction Monitoring Plan). Specifically, the data would be used to determine whether there are displacement impacts to wildlife from offshore wind development in the offshore waters of New Jersey.

As described in **Section 1.4**, DOE and USACE have jointly re-initiated consultation related to impacts to federally listed species under ESA and EFH protected under the Magnuson-Stevens Act. DOE and USACE determined the Proposed Project *may effect but is not likely to adversely affect* the following federally listed species: Atlantic right whale, humpback whale, fin whale, sei whale, blue whale, sperm whale, Kemp's ridley sea turtle, loggerhead sea turtle, green sea turtle, leatherback sea turtle, hawksbill sea turtles, Atlantic sturgeon, shortnose sturgeon, roseate tern, piping plover, red knot, northern long-eared bat, and seabeach amaranth with the inclusion of the Department of the Army special permit conditions. DOE and USACE have determined that the Proposed Project would have *more than minimal but less than substantial adverse effects* on EFH and related species of concern. In a letter dated June 22, 2015, the NMFS concurred with the determination that the Proposed Project would have more than minimal but less than substantial adverse effects on EFH and related species of concern; and offered several conservation recommendations.

By letter dated April 10, 2015, the USFWS concurred with the determination that the Proposed Project is not likely to adversely affect federally listed or candidate species under their jurisdiction. In a letter dated May 11, 2015, the NMFS determined re-initiation of ESA consultation was not necessary and the original determination (May 2012) that the Proposed Project is not likely to adversely affect any listed species under their jurisdiction remains valid.

3.4.2.1 Marine Mammals and Sea Turtles

The following section describes potential environmental consequences to marine mammals and sea turtles throughout the phases of the Proposed Project.

Construction Phase

Vessel Traffic

Ship and barge noise is associated with bringing workers and construction materials to the site, laying underwater cables, and providing work platforms for construction. The noise is generated mainly from the turning of propellers, engine noises and other ship noises, and from the interactions of waves with the ship's hull. Several studies indicated that the underwater propeller noise is the strongest noise from ships and can reach up to 160 dB. Small outboard motor vessels produce broadband sounds of about 150 dB These sounds are attenuated to the range of 85 to 140 dB at a distance of 165 feet from the source (Richardson et al. 1991).

Ketten (1998) summarized that the vocalizations of most animals are tightly linked to their peak hearing sensitivity. Therefore it is generally assumed that baleen whales hear in the same range as their typical vocalizations. Sea turtles possess an overall hearing range of approximately 100 to 1,000 Hertz (Hz), with an upper limit of 2,000 Hz (Ridgway et al. 1969; Lenhardt 1994; Bartol 1999; Ketten and Bartol 2006). Although it is difficult to determine whether sea turtle response to vessel traffic is visual or auditory in nature, it is assumed sea turtles can hear approaching vessels given their hearing range (Bartol et al. 2002; Bartol and Musick 2003; Ketten and Bartol 2006; Moein and Ketten 2006; Levenson 2004). Juvenile loggerhead, Kemps ridley and green sea turtles can be found foraging normally in the Peconic Estuary of Long Island Sound in New York between July and October when low frequency (200 to 700 Hz) noise levels are routinely between 102 and 113 dB (Samuel et al. 2005). Considerable variation exists among marine mammals and sea turtles in hearing sensitivity and absolute hearing range (Richardson et al. 1985;

1995; Ketten 1998). From what is known of right, humpback, and fin whale hearing and the source levels and dominant frequencies of the construction noise sources, it is evident that if present in the area where the underwater noise occurs, right, humpback, and fin whales are capable of hearing construction related noises, and have hearing ranges that are likely to have peak sensitivities in low frequency ranges that overlap the dominant frequencies of pile driving and vessel noise (NMFS 2010; **Figure 12**). Sea turtles do not appear to be overly disturbed by the physical presence of or sounds produced by vessels and vessel traffic, and may simply dive when approached by a vessel and avoid areas of intensive human activity (Vella et al. 2001; Westerberg 1999; NMFS 2002).

The sounds of vessels, similar to those described above, would be clearly audible to marine mammals and sea turtles in the vicinity of the Project area and transit routes. During construction activities, vessel traffic bringing equipment and personnel to offshore construction sites may affect marine mammals. It is estimated that during the construction of the Project there would be between one and five ships at sea associated with the Proposed Project, which is minor relative to the number of recreational and fishing boats that are known to frequent the area on a routine basis. Due to this low level of vessel traffic that would occur during construction, general disturbance associated with vessel movements would be limited and short-term in nature. The likelihood of a Project vessel collision with a marine mammal would also be low. Consequently, adverse impacts related to vessel traffic during the construction phase of the Proposed Project would be minor and short-term.

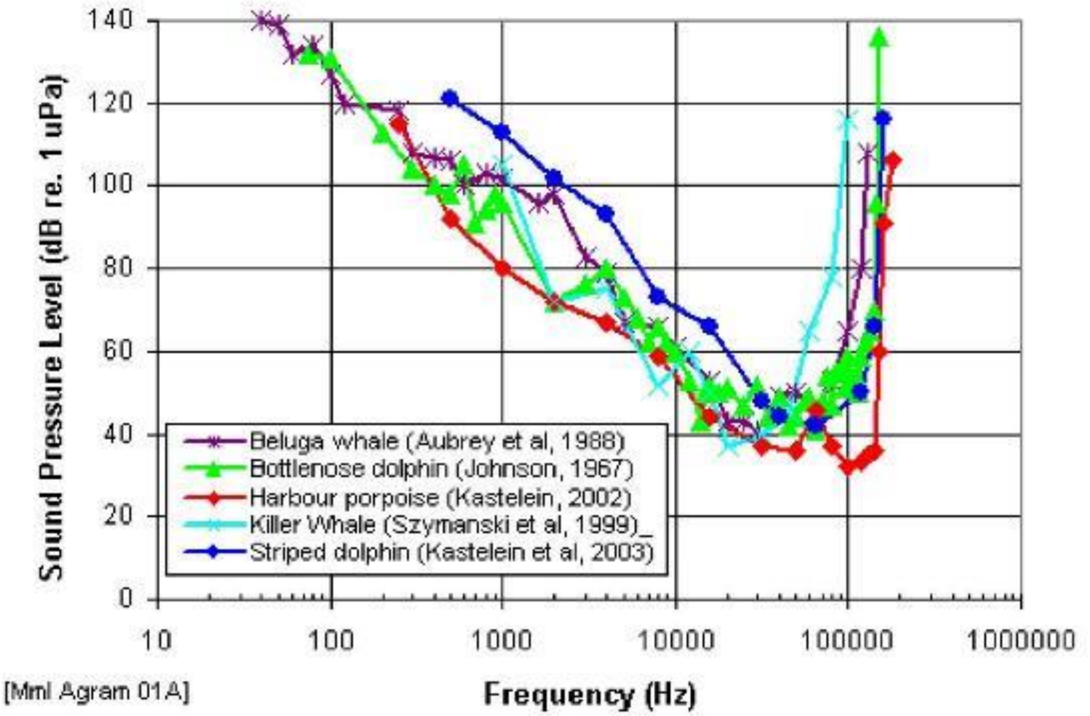

Figure 12. Hearing threshold data for marine mammals (from Nedwell et al. 2007).

Construction Noise

Marine mammals and sea turtles are sensitive to a wide range of sound frequencies, with different species exhibiting varying sensitivities to differing frequencies. Pile-driving, necessary to install the proposed turbine foundations, creates a loud broad-band sound that spans across many frequencies; however, the sound perceived by an individual marine mammal or sea turtle species will be limited to those that the species has the ability to hear.

Pile-driving is typically carried out at up to 50 blows per minute until refusal penetration rate is achieved. Sound levels diminish with distance from the source; peak sound pressure levels of 205 dB at a distance of approximately 70 feet from the piling could be reached in water. In water, the sound pressure diminishes with distance at a rate of about 4 to 5 dB per doubling of distance (Thomsen et al. 2006; Nehls et al. 2007). The peak sound pressure generated is strongly associated with the size of the piling, installation methods, bathymetry and substrate type (Nehls et al. 2007; Nedwell et al. 2007). Strong pulses or continuous loud noise may cause temporary or permanent damage to marine mammal hearing. The threshold intensity of constant or impulsive sound for injury to the hearing apparatus of marine mammals is approximately 200 dB (Greenlaw 1987; McCauley 1998). From a regulatory perspective, broadband sound pressures exceeding 180 dB for cetaceans and exceeding 190 dB for pinnipeds may cause injury (NMFS 2002).

The sound effects of pile-driving the turbine foundations would be intermittent and spread over a period of 2 months during the summer of 2017. The length of time associated with the installation of each foundation is a function of the piling diameter, the depth to which the pile would be driven, hammer size, and the characteristics of the bottom. Offshore experience to date has shown that it normally takes approximately 24 hours in fair weather conditions to position the vessel used to install each foundation and anchor or jack it up out of the water.

The MMS, in their EA for the Issuance of Leases for Wind Resource Data Collection on the Outer Continental Shelf Offshore Delaware and New Jersey (MMS 2009) and associated BA (MMS 2008) concluded that noise generated from pile-driving activities would result in minimal to negligible behavioral harassment and would not result in injury, death, or population level effects to marine mammals and sea turtles.[8] This conclusion was based on their evaluation for the installation of seven meteorological towers with associated oceanographic data collection devices across seven separate lease blocks, one of which includes the Fishermen's meteorological tower on Lease Block 6931. The MMS specifically concluded that because of the limited location and duration of pile-driving activities, it is expected that few individuals would be present within the Project area and that marine mammals and sea turtles would likely leave the immediate vicinity of the pile-driving.

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[8] The name of the Minerals Management Service was changed to the Bureau of Ocean Energy Management, Regulation, and Enforcement under Department of Interior Order No. 3302 (18 June 2010).

The MMS pile-driving assessment was based on the noise levels cited in Madsen et al. (2006) and Thomsen et al. (2006). Both of these papers focused on noise generated during the construction of offshore wind farms, and both used sound estimates and actual measurements for pile-driving wind turbine foundations. The MMS finding of no adverse impact for pile-driving individual meteorological towers can therefore be extrapolated to individual wind turbine foundations.

The Proposed Project would include six turbines, and the pile-driving activities would last for a duration of no longer than 2 weeks. As the pile driving process for each of the six turbine installations is anticipated to require a total of 12 to 15 hours of driving time, any impact or displacement of fish and mammals would be minor and short in duration.

Further, the implementation of mitigation and monitoring measures would minimize or eliminate the potential harmful effects on marine mammals and sea turtles (MMS 2008, 2009). The NMFS May 14, 2009 response to the MMS request for consultation pursuant to the ESA determined that no listed whales or sea turtles would be exposed to any noise greater than 160 dB, provided that a conservative 1,250-meter radius safety exclusion zone would be established per the USACE DA permit condition #16, monitored by marine mammal observers, in conjunction with start-up and shut-down procedures based on species presence and movement (Bluewater and Tetra Tech 2010). The NMFS recommended a 750-meter radius safety exclusion zone around pile driving activities (NMFS 2010). The exclusion zone for listed marine mammals and sea turtles would be established around the foundations being installed in order to reduce the potential for serious injury or mortality of these species. If NMFS updates the conditions regarding noise/exclusion zones on the re-issued DA Permit based on new guidelines, then Fishermen’s would adhere to them as well.

For the New Jersey Project area, an attenuation factor of 15 has been determined, based on local bathymetry, water depth, pile type, and substrate type. Given an estimated Sound Pressure Level (SPL) of 199 dB 10 meters from the source, anticipated SPLs at various distances from pile driving each turbine location are given in **Table 3-8**.

Table 3-8. Pile Driving Noise at Distance

Distance from Source (meters)	Maximum peak SPL (dB)
10	199
100	184
250	174
500	171
1,000	169

Pile-driving noise would likely have a substantially lower perceived noise further from the Project area, and therefore mobile marine animals would be capable of remaining far enough from the noise source to avoid injury or behavioral impacts. In concert with applicant-committed measures (**Section 2.6**), and the short duration of construction noise, noise impacts to marine mammals and sea turtle species from pile driving would be minor and short-term. DOE and USACE have determined that the Proposed Project may affect but is not likely to adversely affect the federally listed marine mammals and sea turtles described here with the inclusion of the Department of the Army special permit conditions described in Section 2.6.3 of this EA. In a letter dated May 11, 2015, the NMFS determined re-initiation of ESA consultation was not necessary and the original determination (May 2012) that the Proposed Project is not likely to adversely affect any listed species under their jurisdiction remains valid.

The laying of submarine cables would also produce noise associated with water jetting, plowing, and sled towing, with the noise intensity and duration depending on the techniques used. Noise related to cable installation would occur over a very short period of time (i.e., 1 to 2 weeks). Marine mammals and sea turtles would initially avoid the noise, but over a short period of exposure, may become habituated and return to their normal movement patterns.

The long-term result of exposure to such construction related noise is not known. However, it is likely that the marine mammals and sea turtles generally become habituated to the high levels of ambient and anthropogenic noise. For example, in a study where juvenile loggerhead turtles were repeatedly exposed to air gun blasts in an enclosed area, the turtles initially avoided the noise, but over a short period of exposure, the avoidance response decreased (Southwood et al. 2008). Similar to turtles, studies off the California and Alaska coastlines have shown that most species of cetaceans become acclimatized to the presence of offshore drilling equipment (Geraci and St. Aubin 1987). However, studies of bowhead whales (*Balaena mysticetus*), a species similar to the North Atlantic right whale, in the Arctic, indicate that individuals would often change course and behavior when exposed to the intense noise generated by active rigs and seismic vessels (Ljungblad et al. 1988; Richardson et al. 1985, 1995; Richardson and MGillivary 1991). Bowhead whales in the Beaufort Sea react, at least briefly, to aircraft, ships, seismic exploration, marine construction, and offshore drill sites (Richardson and Malme 1993). Gray seals (*Halichoerus grypus*) became habituated to construction activities, including pile installation, during construction of the Näsrevet Wind Farm in Sweden (Westerberg 1999). Most baleen whales respond to constant, low-frequency sounds with broad-band intensities of more than 120 dB (ARPA 1995). However, actual thresholds for behavioral responses to sounds in the natural environment depend on the level of natural ambient sound. Whales apparently are able to distinguish sounds in their optimum frequency range that are 10 to 20 dB above ambient levels at the same frequency (Richardson and McGillivary 1991).

Temporary avoidance behavior in marine mammals and sea turtles in the Project vicinity would be expected during construction activity. These behavior changes would be short-term and would likely be similar to the avoidance behaviors observed during heavy pleasure boat use, ferry traffic, or heavy fishing activity in the areas used by these species. With their ability to avoid the construction vessels and the rarity with which protected marine mammal and sea turtle species occur (GMI and Curry & Kerlinger 2011), the potential of Project-related vessel strikes and acoustical impacts from boats would be negligible for turtles. In addition, marine mammal and sea turtle monitoring and avoidance techniques used during construction activities and other applicant-committed measures (refer to **Section 2.6**) would further reduce the potential impacts to marine mammals or sea turtles. In addition, the applicant-committed measures described in **Section 2.6** would greatly reduce the possibility of noise-related injuries to marine mammals. Consequently, adverse impacts related to construction noise during the construction phase of the Proposed Project would be minor and short-term. DOE and USACE have determined that the Proposed Project may affect but is not likely to adversely affect the marine mammal and sea turtle species described here with the inclusion of the Department of the Army special permit conditions described in Section 2.6.3 of this EA. By letter dated, May 11, 2015, the NMFS determined re-initiation of ESA consultation was not necessary and the original determination (May 2012) that the Proposed Project is not likely to adversely affect any listed species under their jurisdiction remains valid. Regarding species protected by the Marine Mammal Protection Act (MMPA), the USACE relied on discussions between FACW and the NMFS Gloucester, Massachusetts and Silver Spring, Maryland offices as part of the development of the MMPA IHA to resolve concerns with marine mammals and sea turtles. A request for IHA for construction of the Project, including pile-driving required for the six turbine foundations, was submitted on August 26, 2011 and approved by NMFS on June 27, 2012. Special conditions 15 through 26 of the Individual Permit outline requirements for the protection of MMPA species during construction (refer to **Section 2.6.3**).

Hazardous Materials Spills

Fuel spills or leaks from vessels and construction equipment could occur during the construction phase and impact marine mammals and/or sea turtles. Such releases could indirectly alter their habitat by affecting sensitive environments, such as foraging grounds, and could result in direct impacts by causing injury or mortality. However, all marine construction and maintenance contractors for the Proposed Project would have an OSRP developed specifically for the Proposed Project, with a Response Provider identified and engaged to immediately deliver any required services. Additionally, vessels used in the construction of this Proposed Project would use established shipping ports and channels with depths sufficient for the safe navigation of boat traffic, minimizing the likelihood of a vessel accident. All appropriate safety protocols would be employed to preclude collisions or accidental spills and leaks. Consequently, the likelihood of such spills is relatively low because of the small number of boats that would be required and the measures in place to prevent spills and leaks (i.e., best management practices, spill response plans). If spills occurred, the volume of fuel and area that could be affected would be relatively small. Such spills would be unlikely to measurably affect marine mammal or sea turtle populations. Therefore, the accidental discharge of waste materials or fuels is expected to result in negligible, short-term adverse impacts during construction activities. DOE and USACE have determined that the Proposed Project may affect but is not likely to adversely affect the marine mammal and sea turtle species described here with the inclusion of the Department of the Army special permit conditions described in Section 2.6.3 of this EA. By letter dated, May 11, 2015, the NMFS determined re-initiation of ESA consultation was not necessary and the original determination (May 2012) that the Proposed Project is not likely to adversely affect any listed species under their jurisdiction remains valid.

Habitat Alteration

Habitat in the Project area would be altered through small scale loss of sand bottom areas and creation of hard surface artificial reef. The bare sand bottom directly covered by the footprint of the turbine foundations may be altered along with the resident benthic organisms and those consumers that prey on them. The adverse impacts from alteration to the sandy bottom along the submarine transmission cable route would be minor and short-term as natural sediment accretion would occur again after construction is complete.

Operations and Maintenance

Marine Habitat

The foundation structures would become hard surface habitat for a wide variety of invertebrates and fish. The artificial reefs created around each turbine would allow for attachment of sessile invertebrates (e.g., anemones and mussels), feeding areas for mobile invertebrates (e.g., starfish, crabs, and lobster), and structure and feeding areas for fish. The new habitat would make available different prey with areas of localized abundance. Therefore, implementation of the Proposed Project would have minor long-term beneficial impacts on subsurface marine habitat. However, these benefits would be lost following the decommissioning phase of the Proposed Project.

Operational Noise

Noise and vibrations associated with the operation of the turbines would be transmitted into the water column and through the sediment. Underwater sound from wind turbines is mainly generated by vibrations in the tower and sound propagation is a function of seabed conditions, foundation type, turbine design and other factors. Generally underwater sound from wind turbines show low frequency sound levels, with source level spectra having a maximum of 153 dB at 3 feet and at a frequency of 16 Hz. The measurements are of individual wind turbines of a relatively low power (Nedwell and Howell 2004).

In operational offshore wind farms, the level of noise has been found to be low, with no evidence that operational noise may cause marine animals to avoid the area. The general wind farm area was found to be approximately 2 dB noisier for fish and no noisier for mammals than the surrounding area (Nedwell et al. 2007). Additionally, the high wind would also make the sea rougher and ambient conditions would be correspondingly noisier. In calm conditions, the ambient noise would be lower, allowing a larger detection range for turbine noise. However, the same conditions that create calm sea conditions cause the turbines to be calm as well.

Thomsen et al. (2006) concluded that the sound pressure from a 1.5-MW turbine at a wind speed of approximately 25 mph would be audible to both harbor porpoises and harbor seals at 325 feet, but at 3,280 feet the signal to noise ratio would be too low for harbor porpoises to detect the noise. Harbor seals would likely be able to detect the noise at a frequency of 125 to 160 Hz for up to 2 miles (Thomsen et al. 2006). Underwater sound attenuation for a 1.5-MW wind turbine was measured to be approximately 4 dB with each doubling of distance (Ingemansson Technology AB 2003). The Cape Wind (2006) Environmental Impact Statement (EIS), which assessed the impacts of up to 130 3.6-MW wind turbine generators, concluded these underwater noise impacts were minimal. They noted there would be no measurable sound beyond 400 feet from state-of-the-art wind turbines. While seals and especially porpoises are sensitive to noise disturbance, there are no studies showing negative effects from the operational sounds from a wind farm on populations of marine mammals. The noise of both strong winds and engines from ships often exceeds the underwater noise generated by operating wind farms (Bergström et al. 2012).

Additional noise would be associated with vessels used for regular maintenance of the turbines (approximately one vessel per week). However, as described for construction-related vessel traffic the number of boat trips associated with maintenance and operation would be small relative to regular recreational boat traffic. Although the distribution of some marine mammal and sea turtle resources could be temporarily adversely affected by noises from these vessels, the noise associated with maintenance vessels would be minor and would have no persistent effects on marine mammal or sea turtle resources, including impacts to navigation, mating, or nesting grounds.

Electromagnetic Fields (EMF)

Historically, power transmission cables that were used for long distance submarine transmission from power stations had a strong EMF that are thought to have negative impacts on marine organisms. These systems are no longer used. Now cable systems use alternating current or dipolar direct current. These cables yield very weak EMF, if one is generated at all. The proposed submarine power cables would contain metallic shielding that would effectively block the EMF. In addition, the cables would be buried approximately 6 feet under the sediment or to the extent practicable and thus EMF would not be likely to have any adverse effects on marine mammals (Gerdes and Rehfeldt 2005).

Decommissioning

Upon completion of the wind farm’s useful life, the turbine towers and cables would be removed. The decommissioning would begin with the disconnection of the submarine cables from the turbine switchgear. Each turbine would then be broken down and taken apart using equipment similar to that used in construction and in a similar sequence. It is anticipated that the foundations may need to be cut off as low as 15 feet below the mud line. The cut off to 15 feet below the mudline is the current federal regulation (30 CFR Part 285) for decommissioning renewable energy projects in federal waters. Per federal regulations (30 CFR Parts 250, 1750-1754), associated cables of the Project that are at or above the 3-foot depth or constitute a hazard would to the extent possible be removed using barges and/or jet plow equipment, similar to the equipment used to install the cables. Only marine mammals and sea turtles in the immediate vicinity of the site (i.e., those that had not moved away from the area upon arrival of decommissioning vessels) would be expected to be affected during tower removal and transport and pile cutting.

It is expected that the impacts to the marine mammals and sea turtles in the vicinity of the Project would be minimal. Temporary avoidance behavior would be expected during deconstruction activity. These behavior changes would be short-term and would likely be similar to the avoidance behaviors observed during heavy pleasure boat use, ferry traffic, or heavy fishing activity in the areas used by these species. Accidental discharge of waste materials or fuels is expected to be negligible during decommissioning activities. Similar to construction-related impacts, underwater noise associated with decommissioning activities would be limited, and would be minor and short term. DOE and USACE have determined that the Proposed Project may affect but is not likely to adversely affect the marine mammal and sea turtle species described here with the inclusion of the Department of the Army special permit conditions described in Section 2.6.3 of this EA. In a letter dated May 11, 2015, the NMFS determined re-initiation of ESA consultation was not necessary and the original determination (May 2012) that the Proposed Project is not likely to adversely affect any listed species under their jurisdiction remains valid.

3.4.2.2 Birds and Bats

Observations of bat activity suggest most migratory bat activity occurs at low wind speeds (less than 12 mph) (Reynolds 2006) and mitigation studies at onshore wind farms have shown that increasing the minimum operational wind speed to 12 mph during nighttime migration hours can dramatically reduce migratory bat mortality (Baerwald et al. 2009). As described in **Section 2.6.5**, FACW has agreed to curtail operations under specific low visibility conditions up to an annual maximum of 360 hours per turbine per calendar year during the peak spring (April through June) and fall (August through November) migratory periods. Based on a review of meteorological data from the Atlantic City International Airport, it was calculated that for 2009 and 2010, the wind farm would have been shut down for approximately 122 hours (on average) if these conditions were applied.

Information to support decision making regarding curtailments would be provided by the summation of two sources: forecasts and observations. Hourly forecasts of visibility and cloud height conditions at the Atlantic City International Airport are made available through Terminal Aerodrome Forecasts which are generated by the NOAA National Weather Service. While typically used for flight planning, this information may also be used to predict conditions (and duration) of events that could trigger a curtailment. Current visibility and cloud height observations at the observation station at Atlantic City International Airport (KACY) are also available. Both data sources would be monitored by system operators to provide indications of current or pending curtailment conditions.

While forecasts and condition reports from KACY are a valuable tool for monitoring climactic conditions, it is recognized that this station is 7 miles inland and over 13 miles away from the offshore Project area. This introduces the potential for initiating curtailments when conditions at the Project site do not warrant an event, or otherwise continuing operations when onshore conditions are clear but offshore conditions are below thresholds. FACW would install two monitoring systems, one on the northernmost turbine and one on the southernmost turbine, which would provide real-time data on Project area visibility and cloud heights. The system would integrate a visibility sensor (Vaisala FS-11) and ceilometer (Vaisala CT25K) with a data logger and cell network or other communications system to the operations center. Data would be transmitted to the operations center at regular intervals, and may be configured to send interim messages when conditions exceed a preset threshold. Shutdown would occur during low visibility conditions (i.e., less than 3,280 feet of visibility and/or a cloud ceiling less than 500 feet) during migratory seasons. Curtailment decisions will be based primarily on conditions in the Project area, supplemented by onshore data when appropriate.

The following section describes potential environmental impacts to birds and bats during the different phases of the Proposed Project.

Construction Phase

During construction, temporary changes in the movement of avian species could occur, either away from the Project area during construction due to startling, or towards the activities due to temporary attraction to construction lights. Collisions of various types of birds have been reported at offshore and onshore structures with bright lights, like those on dredge vessels and oil rigs (Kerlinger et al. 2010). While it is possible that birds could collide with construction vessels, it is very unlikely. Another impact could be a temporary increase or decrease in food availability due to disturbance of soil or sediment.

During the installation of the wind turbines, it is possible that some migratory bats would interact with or even land upon construction equipment and supply boats during the night and early morning hours, but this would likely be an incidental event, and it would be unlikely that this would result in mortality or injury (NEES 2009). In addition, temporary avoidance movement away from the Proposed Project during construction due to startling could occur but would not pose an adverse impact to bats.

Adverse impacts to birds and bat species during the construction phase of the Proposed Project would be minor and short-term. DOE and USACE have determined that the Proposed Project may affect but is not likely to adversely affect the federally listed birds and bats described here. In a letter dated April 10, 2015, the USFWS concurred with the determination that the Proposed Project is not likely to adversely affect federally listed or candidate species under their jurisdiction.

Operations and Maintenance

European and North American studies of wind power development sites have demonstrated that some birds can be displaced for hundreds of feet from operating turbines. Such displacement and disturbance from this Proposed Project may result in less use within the areas where turbines would be constructed. This disturbance area may restrict the foraging of some species within the turbine area and may result in migrant birds along the Atlantic Migratory Flyway avoiding the turbines by flying around the area where they would be constructed rather than through that area. Although displacement may occur as a result of the presence of the turbines, the total turbine area occupies such a small area in relation to the overall ocean surrounding it that adverse impacts to birds avoiding the turbines would be minor. If habituation to the turbines occurs in the years after construction, the area of displacement would be reduced and birds would be excluded from an even smaller area than is likely for this small wind Project (Kerlinger 2011).

Seabirds can be killed as a result of collisions with turbine blades: for example, a substantial number of fatalities have been reported at marine wind farms situated close to breeding colonies (Everaert and Stienen 2007). However, while fatalities resulting from collisions with turbines could occur they would be very unlikely as surveys conducted between 2007 and 2010 showed that few of the species observed spent more than a few minutes or hours within the area where the turbines would be located. Just as important, birds were rarely observed flying at the height of rotors (GMI 2010). GMI and Curry & Kerlinger (2011) reported only a small number and percentage of the birds that were observed within 2 to 3 nautical miles from shore in the Project area were flying at the height of turbine rotors. Analysis of 11,972 bird sightings in this distance (i.e., 2 to 3 nautical miles from shore) during 2008 - 2011 indicates only 6.7 percent were flying in the RSZ.

The proposed turbines occupy only a very small portion of the area from 2 to 3 nautical miles from shore. Examining only the area covered by turbine rotors coverage is equal to about 0.3 percent of the area 2 to 3 nautical miles from shore between Longport and Brigantine (GMI and Curry & Kerlinger 2011). In addition, no federally endangered or threatened species, or candidate species were observed within the Project area between 2008 and 2011 (GMI 2010; GMI and Curry & Kerlinger 2011). Further, applicant-committed measures described in **Section 2.6**, such as curtailment during low visibility conditions, would likely decrease the chances of bird strikes. Therefore, collisions with the turbine blades would result in minor, long-term adverse impacts on bird species of concern and would not cause population declines of any bird species.

Additionally, Kerlinger et al. (2010) have published information regarding the relationship between fatalities of night migrants and FAA obstruction lights. Their findings from wind power facilities across North America revealed that the flashing red obstruction lights on wind turbines do not result in greater fatality rates of night migrants. This finding dispels the conception that red flashing FAA lights could cause large-scale fatality events at wind turbines, as has been reported for tall, guyed communication towers with steady burning red FAA lights.

Lights are not known to directly attract large numbers of bats; however, high fatalities of migratory tree bats observed within the range of these species may be explained by the possibility that they are attracted to sounds produced by turbines, a concentration of insects near turbines, and bat mating behavior (Kunz et al. 2007; Cryan 2008; Cryan and Barclay 2009). The primary direct impact of the offshore wind Project to bats is likely to be the mortality of migratory bats when they collide with or encounter the vortex of the rotating blades of the wind turbine generators. Anecdotal data suggest some bats migrate down the Atlantic Coast during the fall migratory season (Hatch et al. 2013), and therefore it is possible that operation of the wind turbines would result in migratory bat mortality. Data from Europe suggest that wind turbine generators can increase local insect densities and therefore have the potential to attract non-migratory bats. However, current understanding of bat ecology suggests that most bats would not travel several miles offshore to hunt for insects (NEES 2009).

NEES and GMI (2011, 2013) conducted bat surveys, on behalf of FACW, in 2011 during spring and fall migration and in 2012 during the spring migration. Data from these studies indicate the likelihood of bats flying in the area near the turbines would be rare. Therefore, collisions with the turbine blades are not likely to adversely affect any bat species of concern and would not cause bat population declines. In addition, applicant-committed measures described in **Section 2.6**, such as curtailment, would likely decrease the chances of bat mortality.

There would likely be no indirect impact of operations on bats either foraging onshore or migrating offshore near the wind turbine generators. A recent study by Nicholls and Racey (2007) has suggested that bats avoid areas with high EMFs such as radar facilities. It is possible that the electrical equipment (either the wind turbines or the electrical substation and transformer) would generate detectable levels of EMF, but it is unlikely that it would produce EMF at levels that have been shown to deter bats (greater than 2 volts/meter). Therefore it is unlikely that the FACW Project would have any long-term indirect impact on bat populations (NEES 2009). DOE and USACE have determined that the Proposed Project may affect but is not likely to adversely affect the federally listed birds and bats described here with the inclusion of the Department of the Army special permit conditions described in Section 2.6.4 of this EA. In a letter dated April 10, 2015, the USFWS concurred with the determination that the Proposed Project is not likely to adversely affect federally listed or candidate species under their jurisdiction.

Decommissioning

During deconstruction, temporary changes in movement of avian species that are prevalent to the area may occur, similar to the construction phase. Similarly, collisions of individual birds and bats with the decommissioning vessels would be possible, although highly unlikely. During deconstruction, it is possible that some birds or bats would interact with or even land upon equipment and supply boats during the night and early morning hours, but this is likely to be an incidental event at best, and it is unlikely that this would result in mortality or injury. Another impact could be a temporary increase or decrease in food availability due to disturbance of soil or sediment. In general, adverse impacts to birds and bat species during the decommissioning phase of the Proposed Project would be minor and short-term. DOE and USACE have determined that the Proposed Project may affect but is not likely to adversely affect the federally listed birds and bats described here. In a letter dated April 10, 2015, the USFWS concurred with the determination that the Proposed Project is not likely to adversely affect federally listed or candidate species under their jurisdiction.

3.4.2.3 Fisheries

The following section describes potential environmental consequences to fisheries resources, including EFH, from the various phases of the Proposed Project. Direct and indirect impacts to fisheries resources during the Proposed Project are generally expected to be similar to those for marine mammals and sea turtles, including vessel avoidance, fuel spills/leaks, habitat alteration, and physical effects from noise. In addition, there are possible impacts from impingement and entrainment, as discussed below.

Indirect impacts to fish resulting from noise affect fishes differently depending on their morphology and biology. Fishes that do not have a swim bladder are likely to use only particle motion for sound detection. The highest frequency of hearing is likely to be no greater than 400 Hz, with poor sensitivity compared to fishes with a swim bladder. Fishes within this group would include flatfish, some gobies, some tunas, and all sharks and rays (and relatives). Hearing in the herring family and their relatives below 1,000 Hz is similar to these fish, but their hearing range extends to at least 4,000 Hz, and some species (e.g., American shad) are able to detect sounds to over 180 kHz (Mann et al. 2001).

Fishes that have a swim bladder but no known structures in the auditory system that would enhance hearing and sensitivity (lowest sound level detectable at any frequency) can detect sounds from below 50 Hz to about 800-1,000 Hz. A wide range of species fall into this category, including tuna with swim bladders, sturgeons, salmonids, etc. Fishes that have some kind of structure that mechanically couples the inner ear to the swim bladder (or other gas bubble), are able to detect a wider bandwidth of sounds and lower intensities than fishes in other groups. These fishes detect sounds to 3,000 Hz or more, and their hearing sensitivity, which is pressure driven, is better. There are not many marine species, but this group may include some species of sciaenids (Ramcharitar et al. 2006). It is also possible that a number of deep-sea species fall within this category based on the morphology of their auditory system (e.g., Popper 1980; Deng et al. 2011). Other members of this group would include all of the tophysan fishes, though few of these species other than catfishes are found in marine waters.

Construction Phase

Temporary avoidance of construction vessels by fish is expected during construction activities. This avoidance would be short-term and would likely be similar to the avoidance behaviors observed during heavy pleasure boat use, ferry traffic, or heavy fishing activity, resulting in negligible impacts to fish species.

Fuel spills or leaks from vessels and construction equipment could occur during the construction phase and impact fisheries resources indirectly by altering their habitat. Such releases could affect sensitive environments such as foraging grounds, and could result in impacts by causing direct injury or mortality. However, the likelihood of such spills is relatively low because of the small number of boats that would be required and the spill prevention measures that would already be in place. In addition, accidental spills would not be a large volume and would be unlikely to measurably affect fisheries populations. Therefore, the accidental discharge of waste materials or fuels is expected to be negligible during construction activities.

There would be infrequent and short duration water withdrawals for engine cooling of vessels during construction activities. The incremental increase in water withdrawal from vessels during construction would be minor and have would have negligible adverse impacts on protected fisheries species. The DOE and USACE have determined that the Proposed Project may have a more than minimal but less than substantial adverse effect on EFH. In a letter dated June 22, 2015, the NMFS concurred with this determination that the Proposed Project may have a more than minimal but less than substantial adverse effect on EFH. In addition, DOE and USACE determined the Proposed Project *may effect but is not likely to adversely affect* the following federally listed fish species: Atlantic sturgeon and shortnose sturgeon with the inclusion of the Department of the Army special permit conditions. By letter dated, May 11, 2015, the NMFS determined re-initiation of ESA consultation was not necessary and the original determination (May 2012) that the Proposed Project is not likely to adversely affect any listed species under their jurisdiction remains valid.

EFH Habitat

As described in **Section 2.5.2.2**, FACW met in Trenton, New Jersey with representatives of the NMFS Sandy Hook field office on November 10, 2010 to discuss the data needs for completion of an EFH assessment and submitted a letter on November 12, 2010 requesting approval from the USACE of the list of species to be evaluated in the EFH. A final EFH report was submitted to the USACE and NMFS on May 3, 2011 and approved in correspondence dated June 28, 2011.

The EFH assessment found the construction of the Project would result in temporary disturbance of EFH, but the study concluded that the Project would have no more than minimal impacts to species and life stages that have pelagic or demersal EFH habitat in the Project area.

Installation of the turbine foundations would result in the loss of approximately 1.0 acres of benthic EFH habitat (refer to **Section 2.5.2.2** for a summary of the consultation associated with EFH and fisheries). Benthic invertebrates and shellfish, important as forage for federally-managed species, inhabiting the areas under the piles would be lost along with any fish species and lifestages unable to avoid the construction activity. This habitat would be unavailable to support surf clams or the ten demersal protected fisheries species described in **Section 3.4.1.4**.

There would be additional short-term minor adverse impact associated with the temporary disturbance of the benthic EFH habitat during placement of the foundation piles (1.0 acres) and cable (3.66 acres). Installation of the foundation piles would likely result in temporary disturbance as a result of anchoring of support vessels or placement of the jack-up barge. Installation of the foundations would take approximately 1 day per turbine, with the total not exceeding 2 weeks. Installation of the transition pieces and turbines on top of the foundation and transition piece would be above the water line and therefore would not directly impact EFH. However, vessels necessary to install this equipment may result in indirect noise impacts (see discussion below).

Approximately 3.66 acres of benthic EFH habitat would be adversely impacted as a result from cable installation. Cable installation would last for approximately 1 to 2 weeks. Use of jet plowing for cable installation confines disturbance to a narrow trench, approximately 5 feet wide. There would be additional disturbance and temporary loss of habitat around the borehole where the 12-inch diameter HDD conduit would break out of the seabed. Anchor line sweep, anchoring, and skids on the jet plow would also temporarily disturb small additional areas of substrate. Jetting, and to a much lower degree, plowing, would result in temporary suspension of sediments, potentially causing additional benthic impacts from burial or smothering near the trench. All of these adverse impacts would be short-term and minor. The DOE and USACE have determined that the Proposed Project may have a more than minimal but less than substantial adverse effect on EFH with the inclusion of the conservation recommendations, any adverse effect on EFH is not going to be substantial as a result of the Proposed Project.

As described above, construction would result in temporary and permanent minor adverse impacts to demersal species, especially their EFH. These impacts could affect habitat, nursery/spawning, and benthic macroinvertebrate forage base, depending on the species and time of year. The turbine foundations can also cause indirect reef effects on the flow patterns and the sediment composition around the foundations. These may influence benthic fish species through changes in food sources, burying ability and predator densities (DEA 2006). For more discussion on the recovery times of the sediment and benthic community recovery times, see **Section 3.4.2.4** below.

Pelagic EFH species and shellfish with pelagic eggs and larvae would not be affected to the same degree. Cable installation would disturb approximately 0.14 acres of winter flounder egg EFH and 0.38 acres of winter flounder larvae EFH. Juvenile and adult protected fisheries species could be displaced or killed during construction. The conversion of the soft substrate benthic communities to hard substrate foundations can lead to new habitats similar to artificial reefs and potentially benefit pelagic species. See the discussion under operations and maintenance below for more on changes that result from artificial reefs.

Protected fisheries species would not be exposed to increased levels of contaminants either through direct contact with the substrate or through ingestion of prey items due to the limited possibility of contaminants being released during soil disturbance or as part of construction activities. Elevated turbidity and TSS can negatively affect protected fisheries species by reducing visibility, interfering with the ability to detect prey and find suitable habitat (Appleby and Scarrat 1989). Demersal egg hatching and survival as well as some benthic invertebrate survival can be reduced if substantial amounts of sediment settle over eggs. These activities would be of short duration, several weeks at most. Any sediments that are disturbed during construction would rapidly settle out. Furthermore, the current wave regime in the Project area is relatively dynamic so there are likely relatively high levels of TSS and turbidity at least episodically (i.e., during storms). Species present in the Project area are probably accustomed to high levels of TSS, so that the risk of adverse impacts from short term increases resulting from construction is low. In general implementation of the Proposed Project would have minor short-term impacts with regard to soils and water quality. For more on potential impacts to soils and water quality, refer to **Section 3.3.2**. The DOE and USACE have determined that the Proposed Project may have a more than minimal but less than substantial adverse effect on EFH with the inclusion of the conservation recommendations, any adverse effect on EFH is not going to be substantial as a result of the Proposed Project. In a letter dated June 22, 2015, the NMFS concurred with this determination that the Proposed Project may have a more than minimal but less than substantial adverse effect on EFH.

Noise

As described in **Section 3.4.2.1**, construction activities would contribute to increased underwater noise in the Project area from ship and barge traffic related to delivery of workers and construction materials and the actual construction activity (including cable installation and pile-driving).

Sound production and hearing sensitivity in fish is diverse, corresponding to their many different types of auditory structures. Many fish hear in the range of 30 to 1,000 Hz, but others can hear in the infrasonic range below 20 Hz (Karlsen 1992; Knudsen et al. 1997; **Figure 13**). Most of the noise associated with offshore wind farming (ships, pile driving, turbine operation, etc.) yields energy below 1,000 Hz and is within the range of hearing for most fish (Thomsen et al. 2006). Several species of commercially important

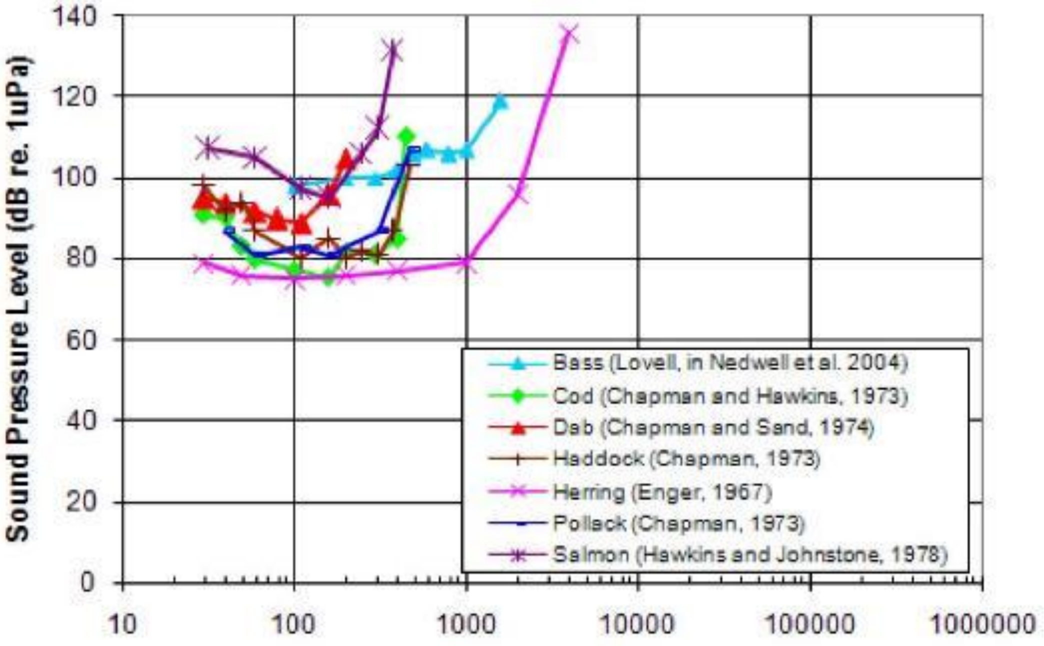

Figure 13. Hearing threshold data for marine fish (from Nedwell et al. 2007).

fish (e.g., cod, herring, dab and salmon) were assessed in European waters, and it is believed that these fish species may be able to perceive pile-driving noise at distances up to 50 miles from the source (Thomsen et al. 2006). Though some reports indicate that pile-driving noise can cause severe hearing damage to fish close to the noise source, more research is needed to determine the extent of potential physical effects especially across a diverse set of species (Thomsen et al. 2006). However, expected pile-driving and cable laying noise is likely to have a substantially lower perceived noise at distance from the Project area. Mobile fish species should be capable of remaining far enough from the noise source to avoid injury or behavioral impacts. Noise impacts to fish species can be minimized, especially when accounting for applicant-committed measures (**Section 2.6**) and the short duration of construction noise.

Fish could be impacted by underwater noise through both sublethal and lethal effects. Sublethal effects include behavioral effects such as feeding, schooling, and reproduction; soft tissue impacts; hearing loss; visual impairment, and other physiological conditions (Thomsen et al. 2006). The degree to which a fish is impacted by noise is dependent on several factors. These can include both the species and lifestage of fish as well as environmental factors such as water depth, hydrodynamic regime, and substrate type.

Sound levels injurious to fish have been estimated in several ways. On the west coast, the Fisheries Hydroacoustic Working Group composed of state Departments of Transportation, NMFS, and USFWS established interim noise exposure criteria for pile-driving based on absolute noise levels protective of most marine fish species. These are 206 dB peak exposure and 187 dB accumulated sound exposure level (SEL) for fish more than 2 grams (CalTrans 2009). Studies at five wind farm sites around England had an average unweighted peak construction noise level of 250 dB at 3 feet (Nedwell et al. 2007), which exceeds the NMFS-defined peak noise criterion. The distance at which noise levels dropped below 200 dB ranged from 1 to 8 miles. In other words, pile-driving generated adverse noise levels at distances up to 8 miles away from the noise source. Nedwell et al. (2007) recommended use of a criterion geared to the species-specific hearing ability in units $dB_{ht.}$ A sound pressure level equivalent to 130 dB_{ht} (130 dB above the hearing threshold for that species) was defined as injurious and sound pressure level equivalent to 90 dB_{ht} was defined as a behavioral threshold generating an avoidance response. The Cape Wind Draft EIS predicted perceived sound levels from pile driving for several finfish including one EFH species present in the Project area (e.g., cod) as well as for seabass and tautog. However, predicted underwater sounds would not be injurious to these species even as close as 100 feet from the sound source (MMS 2009). Behavioral effects (e.g., avoidance) would be likely at distances between 200 and 1,150 feet from the source of the sound. Data collected at the five British offshore wind farms (Nedwell et al. 2007) suggests that pile-driving generates sounds that affect behavior over large distances. The Behavioral Impact Range, or distance where noise causes an avoidance reaction, for cod and herring ranged from 1 to 16 miles from the construction activity. Pile-driving would begin with a soft start to allow fish to leave the area before maximum sound levels occur (refer to **Section 2.6**). Consequently, impacts as a result of the Proposed Project would be minor and short-term. The DOE and USACE have determined that the Proposed Project may have a more than minimal but less than substantial adverse effect on EFH with the inclusion of the conservation recommendations, any adverse effect on EFH is not going to be substantial as a result of the Proposed Project. In a letter dated June 22, 2015, the NMFS concurred with this determination that the Proposed Project may have a more than minimal but less than substantial adverse effect on EFH.

Entrainment and Impingement

Jet plow operations for installing the cable would require water withdrawals, which could result in entrainment or impingement. Entrainment occurs when intake pipes take in small aquatic organisms, including plankton, fish eggs, and larvae, with the intake water. Impingement occurs when fish or other larger organisms are pinned or trapped against the screens of intake structures. Jet plows generally withdraw surface water for use in operations. Ichthyoplankton eggs and larvae would be entrained during the operation. A jet plow operation can utilize anywhere from 1,500-4,200 gallons per minute, progressing at a 1,312 feet per hour (Kober et al. 2002). A rough estimate for this jet plowing included in the Proposed Project could be 4 million gallons.

Ichthyoplankton larval data for the New York Bight area were secured from MARMAP sampling program (conducted from 1977 through 1987) and ECOMON program (2004 through 2005) for the proposed Safe Harbor project (Normandeau 2007). While not collected in the Project area, these data can be considered to qualitatively reflect the ichthyoplankton community in the Project area. Entrainment was estimated by multiplying average density by the total water used in jet plow operation (see **Table 3-9**).

Table 3-9. Estimates of Potential Larval Entrainment of the Proposed Project based on Annual Average of Monthly Densities of Fish Larvae Collected by MARMAP (1977-1987) in the New York Bight

Species	Larval Density (per 100 m^3) [1]	Estimated Jet Plow Entrainment of Protected Larval Species[2]
Black sea bass	0.66	100 (0-212)
Bluefish	2.21	335 (0-911)
Cobia	0	0
King mackerel	0	0
Monkfish	0.28	42 (0-101)
Spanish mackerel	0	0
Summer flounder	1.13	171 (0-372)
Winter flounder	0.13	20 (0-48)
Red Hake	0.29	44 (0-103)
Windowpane flounder	2.76	418 (75-775)
Witch flounder	0.22	33 (0-74)
Yellowtail flounder	3.44	521 (0-1229)

[1] 1 cubic meter = 264 gallons

[2] numbers in parentheses indicate the lower-upper 95 percent confidence interval

Source: Normandeau 2007.

Based on this calculation, the estimated number of ichthyoplankton from protected species entrained by the jet plow could range from 0 for Spanish mackerel to 521 for yellowtail flounder. This level of ichthyoplankton loss is minimal compared to the potential overall number of ichthyoplankton larvae dispersed into the Project area. As a frame of reference, approximately 100 black sea bass larvae would be lost from entrainment, but a female black sea bass, 2 to 5 years of age in the Mid-Atlantic Bight, releases between 191,000 and 369,500 eggs annually (Mercer 1978). Consequently, impacts as a result of entrainment and impingement would be minor and short-term. The DOE and USACE have determined that the Proposed Project may have a more than minimal but less than substantial adverse effect on EFH with the inclusion of the conservation recommendations, any adverse effect on EFH is not going to be substantial as a result of the Proposed Project. In a letter dated June 22, 2015, the NMFS concurred with this determination that the Proposed Project may have a more than minimal but less than substantial adverse effect on EFH.

Operations and Maintenance

Electromagnetic Fields

Transmission of electrical currents through buried cables causes emission of magnetic fields into the water column, the strength of which varies directly with the electrical voltage. Movement either of currents or swimming organisms through the magnetic field creates an induced EMF. The relatively low voltage proposed for the Proposed Project cable would result in a relatively low magnetic field strength, and, subsequently, a low induced EMF strength. Elasmobranchs have been found to be most sensitive to low frequency alternating EMFs (from 1 to 10 Hz), although strong field intensities at frequencies up to 25 Hz can also elicit a response (New and Tricas 1997; Bodznick et al. 2003). Alternating current (AC) transmissions in the US are typically 60 Hz, which results in a field reversal 60 times per second, a rate to which it is unlikely that elasmobranchs could respond. Thus, exposure to a low voltage, 60 Hz AC cable is unlikely to affect elasmobranchs. Even if a shark or teleost fish detected the EMF from this cable, the response would be very localized and more likely in demersal species than pelagic species, particularly given the mobility of these species. EMF from the Proposed Project would be further reduced by the metallic shielding in the cable that would block the EMF. As the strength of magnetic and electrical fields decreases with increasing distance (Götz et al. 2009), EMF exposure would be further reduced by burying the cable 6 feet below the seabed. Therefore, EMF would have a negligible long-term adverse impact on fish species. The DOE and USACE have determined that the Proposed Project may have a more than minimal but less than substantial adverse effect on EFH with the inclusion of the conservation recommendations, any adverse effect on EFH is not going to be substantial as a result of the Proposed Project. In a letter dated June 22, 2015, the NMFS concurred with this determination that the Proposed Project may have a more than minimal but less than substantial adverse effect on EFH.

Noise

Sound generated during wind farm operation has the potential to adversely affect EFH species. The Proposed Project would generate additional noise related to both turbine operation as well as from vessels tending the Project (approximately one vessel per week). The Project area is in an area of active vessel use including shipping and commercial and recreational fishing. Incremental vessel operations related to the Project are not expected to result in a substantial increase in noise levels.

Noise and vibrations associated with the operation of the turbines would be transmitted into the water column and through the sediment. A general wind farm area was found to be approximately 2 dB noisier for fish than the surrounding area (Nedwell et al. 2007). Thomsen et al. (2006) calculated that dab and salmon may be able to detect operational noise from a wind turbine up to 0.60 miles from the source, and that cod and herring could detect such sounds up to 3 miles from the source. Thomsen et al. (2006) and Wahlberg and Westerberg (2005) estimated that fish would avoid operating turbines only up to 15 feet from the structure. Habituation of fish to the sounds associated with such structures could also occur (Thomsen et al. 2006).

Noise and vibration associated with operation of the turbines would be transmitted into the water column and sediment. The levels vary depending on the depth, substrate type, foundation type, turbine design, etc. Operational noise at four British wind projects (2 to 3 MW) ranged from 114 to 130 dB within the turbine arrays (Götz et al. 2009). The authors concluded that noise levels from wind farm operation were below thresholds that could cause avoidance behavior for several fish species, including two EFH species, cod and herring. Operational sound levels were modeled for the Cape Wind project, and hearing-threshold calculated. The conclusion was that operational sounds would be marginally audible to finfish only at a distance of 65 feet. No injury or behavioral effects were anticipated from the project. Underwater sound emanating from the FACW Project would be similar to these projects and would have minor long-term adverse effects on the EFH species.

Additional noises would be associated with vessels used for regular maintenance of the turbines (approximately one vessel per week). Although the distribution of some fish resources could be temporarily affected by these noises, no persistent effects on fish resources are anticipated.

These effects would not directly adversely impact the natural functioning of marine fish, including reproductive, spawning, and migratory patterns, nor species abundance or diversity. It is likely that the construction of the turbines would increase the number of marine fish species near the turbines by providing submerged physical structures and subsequently, a more heterogeneous habitat for marine organisms.

There would be infrequent and short duration water withdrawals for engine cooling of vessels during servicing periods. Servicing would include annual major service (4 to 6 days) and minor servicing (1 to 2 days, twice per year). These water withdrawals would be no different than any other vessel operating in the Project area and the number of vessels involved during maintenance and servicing is extremely limited (approximately one per week). The incremental increase in water withdrawal from vessels during operations would be minor and have negligible adverse impacts on protected fisheries species.

Overall, long-term adverse impacts to fish species as a result of operations and maintenance of the Proposed Project would be minor. The DOE and USACE have determined that the Proposed Project may have a more than minimal but less than substantial adverse effect on EFH with the inclusion of the conservation recommendations, any adverse effect on EFH is not going to be substantial as a result of the Proposed

Project. In a letter dated June 22, 2015, the NMFS concurred with this determination that the Proposed Project may have a more than minimal but less than substantial adverse effect on EFH.

Decommissioning

Impacts to the fisheries resources in the vicinity of the Proposed Project during decommissioning would be minimal. Only fish in the immediate vicinity of the site (those that had not moved away from the area upon arrival of decommissioning vessels) would be expected to be affected during tower removal and transport and pile cutting. Temporary avoidance behavior is expected during deconstruction activity. These behavior changes would be short-term and would likely be similar to the avoidance behaviors observed during heavy pleasure boat use, ferry traffic, or heavy fishing activity in the areas used by these species. Accidental discharge of waste materials or fuels is expected to be negligible during decommissioning activities. Underwater noise associated with decommissioning activities would be limited, and would not adversely impact aquatic fish resources in the vicinity of the Project (MMS 2009; Cape Wind 2006). Water withdrawals associated with engine cooling would be infrequent and short duration. Decommissioning would also result in temporary minor impacts to EFH habitat, similar to construction impacts. It is anticipated that the foundations may need to be cut off as low as 15 feet below the mud line. The cut off to 15 feet below the mudline is the current federal regulation (30 CFR Part 285) for decommissioning renewable energy projects in federal waters. This would remove habitat created by the foundations of the turbines. However, decommissioning would return the Project area to its natural state prior to construction of the turbines. Over time the natural community would recover and return to existing conditions. In general, decommissioning would result in minor short-term adverse impacts to fish species. The DOE and USACE have determined that the Proposed Project may have a more than minimal but less than substantial adverse effect on EFH. In a letter dated June 22, 2015, the NMFS concurred with this determination that the Proposed Project may have a more than minimal but less than substantial adverse effect on EFH.

3.4.2.4 Benthos

The following section describes potential environmental consequences to benthic resources (EFH and benthic macroinvertebrates) from the various phases of the Proposed Project. This summary draws from Normandeau (2011b) for a substantial part of the analysis.

Construction

It is estimated that installation of the turbine foundations would result in the loss of approximately 1.0 acres of benthic soft substrate habitat. This would result in mortality to benthic invertebrates inhabiting the areas under the piles and would represent a moderate short-term adverse impact to benthic species within the Project area.

The Proposed Project would result in temporary disturbance of the sea floor during placement of the foundation piles. Cable installation would also result in approximately 3.66 acres of temporary impact. These temporary impacts would be of short duration (e.g., no more than 2 weeks for turbine installation and 1 to 2 weeks for cable installation). Construction activity would likely result in the loss of infauna in the construction zone. Following the proposed construction, benthic macroinvertebrates would likely repopulate the disturbed areas over the cable and around the turbines. The recovery time for benthic macrofaunal communities is variable (ESS Group, Inc. 2013; Elliott et al. 2007). Some of the typical dominant species such as annelids can readily recruit in any season from nearby populations. Those that are opportunistic such as *Streblospio* would likely appear in days to weeks. Other dominants such as amphipods, mollusks, sand dollars (*Echinarachnius parma*) are less mobile and would rely on larval and juvenile recruitment. Larval and juvenile populations are able to repopulate the area more readily in the summer than during winter months. Diaz et al. (2004) estimate that benthic resources would be sufficient for demersal fish forage after a single spring/summer recruitment period.

A study in a shoal area off northern New Jersey (Burlas et al. 2001) determined that in areas of high sediment movement and where sediment removal resulted in shallow pits, species abundance and richness recovered within 1 year; biomass, in particular sand dollar biomass, required 2.5 years to fully recover. These recolonization studies represent a worst case, as they are substantially larger in size and level of disturbance than the Proposed Project. Furthermore, studies show that recolonization after sand mining can be facilitated by leaving small areas undisturbed (i.e., refuges), similar to the areas between turbines, which allow organisms to migrate to disturbed areas.

The Cape Wind project estimated seabed scar recovery from jet plow using sediment transport modeling (MMS 2009). The recovery time ranged from less than a day to 38 days, depending on the depth, current regime, and substrate type. Recolonization of the benthic macroinvertebrate forage base for demersal EFH species would begin immediately although the recovery time for benthic macrofaunal communities is variable and depends on the season and location. Disturbance involving a change in sediment structure or transport can affect the length of recovery time. Literature on benthic recolonization in the mid-Atlantic shelf has mostly been related to recovery after sand mining, a process that results in larger areas (and greater depths) of disturbance than that anticipated for this Project. Recovery time is dependent on three factors: the composition and abundance of adjacent benthic communities; the likely composition of the new substrate; and the season of the disturbance (Diaz et al. 2004).

Operations and Maintenance

The foundations of proposed turbines offshore would be anticipated to have impacts similar to those observed for offshore oil rigs in the Gulf of Mexico and offshore wind facilities in Europe. These anthropogenic structures would likely have an artificial reef effect that would increase both the diversity of fish and abundance of some fish species within the immediate vicinity of the foundations (Bergstrom et al. 2014; Wilhelmsson et al. 2006).

The sediment composition following construction is likely to be similar to the existing conditions along the cable route, as sediment in this high-energy environment would be transported from surrounding areas. Therefore, macrofaunal species composition would also ultimately be similar.

Following recovery of the benthos after construction, the operations and maintenance of the proposed turbine foundations and cable would result in minor long-term adverse impacts to benthic resources.

Decommissioning

Decommissioning would also result in moderate short-term impacts to benthic resources. These impacts associated with vessel anchoring and jacking would be temporary and localized, similar to construction impacts.

3.4.3 No Action Alternative

Under the No-Action Alternative, no construction, operations and maintenance, or decommissioning activities would occur. Existing conditions would remain the same, and therefore, no impacts to vegetation, marine mammals, sea turtles, birds, bats, fish or fisheries, or benthic fauna.

3.5 Cultural Resources

3.5.1 Affected Environment

Cultural, historic, and archaeological resources includes objects, structures, shipwrecks, buildings, neighborhoods, districts, and man-made or man-modified features of the landscape and seascape, including historic and prehistoric archaeological sites, which either are on or are eligible for inclusion on the National Register of Historic Places (NRHP). Pursuant to 36 CFR Part 800.16(d), the DOE has determined in consultation with the SHPO the Area of Potential Effects (APE) for the Proposed Project. The APE consists of the total ocean area considered as the project area which is approximately 170 acres (calculated as the perimeter around the group of turbines, approximately 200 feet in each direction) plus a 5 foot width along the length of the export cable route from the turbines to the shore; and the on-shore portion of the project which is located within a 20-foot-wide easement beneath an approximate 6,500-foot section of the western (southbound) lane of South and North Tennessee Avenues in Atlantic City, New Jersey for the underground cable to be installed that connects the project to existing infrastructure at the Huron Substation, located along Abescon Avenue in Atlantic City, New Jersey. The APE also includes the coastline between Ventnor City and Atlantic City, NJ for potential visual impacts.

The USACE, during their processing of the Department of Army permit, assessed the Permit Area, which is within the Proposed Project APE. According to 33 CFR Part 325, Appendix C, (1)(g), the Department of the Army’s jurisdiction for compliance with Section 106 of the NHPA is limited to the proposed activities within the project’s “Permit Area”. Based on a review of the above referenced project, the USACE determined that the “Permit Area” includes the following: the turbine generator locations with associated fill, submerged cable routes, the area of the vault at terminus of Tennessee Avenue, and upland cable installation to the power station.

For a summary of consultation regarding cultural resources, refer to **Section 2.5.2.2**. The potential for the Proposed Project to adversely impact any cultural, historic, or archaeological resources was evaluated using a multitude of approaches:

1. A comprehensive file review was conducted at the NJDEP SHPO offices in Trenton, NJ.
2. A database inquiry was submitted to the NJ State Museum.

3. A geotechnical and geophysical survey was conducted in conjunction with a marine remote sensing cultural resources investigation at the Project area in order to determine the presence of submerged historic river valleys along the cable route (Robinson 2010).

4. A Phase I marine archaeological survey (Robinson 2011) was conducted in conjunction with the geotechnical and geophysical surveys in order to determine the presence of any historic artifacts (Alpine Ocean Seismic Survey, Inc. 2011).

5. A Phase I archeological survey was completed for the terrestrial portion of the Project area (Basilik and Ruth 2011, see below).

6. A viewshed analysis was performed to determine the impact the sight of the turbines might have on visitors to shoreline historic locations (AMEC 2010, 2015 see below).

Past Cultural Resource Investigations

The SHPO file review found four cultural resources investigations to have been conducted near the Proposed Project area as described below.

1. A Phase I Archaeological Survey was conducted for the proposed ACBC in Atlantic City, Atlantic County, New Jersey. The survey concluded the salvage of accidental discoveries for public interpretation was encouraged; otherwise, additional archaeological services were not recommended. Given the low probability for the occurrence, much less the survival, of significant archaeological remains, further investigation was not recommended (Robinson 2011).

2. A Phase I submerged and shoreline cultural resources investigation was conducted of two proposed sand borrow areas along Absecon Island, Atlantic County, New Jersey. Five magnetic underwater targets were identified in Burrow Area I and may represent significant underwater resources such as historic shipwrecks (Cox and Hunter 1995).

3. A cultural resource survey of Sewell Avenue and Nsa Elderly Projects in Atlantic City, New Jersey. On the basis of field test, it showed that there are no significant archaeological resources present (Larrabee and Kardas 1980).

4. A cultural resource survey of the former Atlantic City Friends Meeting House and school. Current research supports a finding that the Atlantic City Friends Meeting House and School Building, although it has some measure of cultural significance, is not eligible for listing on the National Register of Historic Places (Mary Delaney Krugman Associates, Inc. 2004) as it does not meet any of the criteria for listing.

New Marine Cultural Resources Investigations

Fathom Research, LLC (Fathom) completed an archaeological analysis of 17 4-inch diameter vibracores (i.e., core samples of underwater sediments) recovered in late October 2010. The archaeological analysis was conducted to identify evidence of submerged cultural resources and/or archaeologically sensitive, contextually intact, paleosols (i.e., soil horizons that were formed as a soil in a past geological period) within the vibracores as part of the Project area's historic properties identification effort and Section 106 review process. Fathom's analysis of the vibracores consisted of a visual examination of each split vibracore for evidence of submerged cultural resources and archaeologically sensitive paleosols. A scale color photo-mosaic and descriptive information was prepared for each vibracore as they were examined. All of the vibracores were found to contain marine sediments exclusively, with no evidence of submerged cultural resources or archaeologically sensitive paleosols observed to be present (Robinson 2010).

Additionally, a Phase I Marine Archaeological Survey (Robinson 2011) was prepared as an appendix to the Marine Geophysical Survey in Support of an Offshore Wind Farm and Cable Route Construction (Alpine Ocean Seismic Survey, Inc. 2011). The survey reports found no archaeological deposits eligible for listing on the NRHP within the Project's area of potential effects (APE). In addition the surveys found no evidence for submerged landforms with the potential to contain pre-contact period Native American archaeological deposits.

New Terrestrial Cultural Resources Investigations

The Phase I Archeological Survey for the terrestrial area was completed for the Project area in 2011 and no significant cultural resources were identified (Basilik and Ruth 2011).

New Visual Analyses

A viewshed analysis was completed by AMEC in 2010 and revised in 2015 (AMEC 2010, 2015). This visual impact assessment report presents the analysis and findings of visual effect to land-based, aboveground historic resources that may be caused by the development of offshore wind turbines. The methodology used to determine the boundary of the APE for this study followed those used for similar projects, most notably the Cape Wind Energy Project, which used an arbitrary buffer located approximately 300 feet from the Massachusetts shore (PAL 2004; PAL 2006; Cape Wind Associates LLC 2012; Environmental Design & Research 2006; BOEM 2012). The APE includes all of the area between the Boardwalk/Shoreline on the South, 11th Avenue on the West, and New Hampshire Avenue on the East. The northern boundary includes the eastern end of Pacific Avenue, then extends along the western end of Atlantic Avenue following the merger of two throughways. The APE included 12 NRHP and/or state registered historic places. However, three of these locations were demolished limiting the field evaluation to nine places still in existence. Only seven of the nine places would have a view of the wind turbines following the implementation of the Proposed Project.

In consultation with the NJ SHPO conducted on May 1, 2015, it was determined two types of viewpoint photo simulations would be included as part of the revised viewshed analysis to better understand the visual impacts that the addition of wind turbines would have on NRHP listed properties within the established APE. The first perspective for the analysis included the simulated viewpoint from the highest point atop of the selected historic properties within the APE out towards the proposed locations of the turbines, while the second visual perspective included the viewpoint of the turbines looking back at the Atlantic City shoreline towards the National and/or State Register of Historic Places sites.

3.5.2 Environmental Impacts Related to Cultural Resources

Construction Phase

Based on marine, terrestrial, and viewshed cultural resources investigations in the terrestrial and marine environments, no significant cultural resources have been identified within the Project area. The New Jersey SHPO provided concurrence in a letter dated April 1, 2015 with the DOE's assessment that no additional archaeological survey or consideration of archaeological resources is necessary within the APE. In addition it was determined implementation of the Proposed Project would result in no direct effect to historic properties eligible for or listed on the National and/or State Register of Historic Places during the construction phase. However, if additional submerged archeological resources are discovered during Project implementation, consultation would be reinitiated with the SHPO pursuant to 36 CFR Part 800.13.

Operations and Maintenance

Based upon the photographs generated with the overlying depiction of the turbines (for example, see **Figure 14**) and their respective size and location in relation to the various historically sensitive areas investigated as a part of this viewshed analysis, views of the turbines would not negatively affect the viewscape (AMEC 2010, 2015). The turbines would only be visible from seven national and/or state registered historic places between Ventnor City and Atlantic City. In all of these locations, the turbines in the horizon would appear as structures that would be much smaller in comparison to surrounding structures on land (AMEC 2010, 2015). In effect, while individuals would potentially be able to see the turbines when standing on the shore to some degree, they would be barely distinguishable on the horizon. These observations are supported by studies of offshore windfarms by the Scottish National Heritage that determined that within the perceptible range of the human eye, turbines located at this particular distance, combined with the small number of turbines and the spacing between them, significantly impedes the visual awareness of the windfarm structures from the mainland (Department of Trade and Industry 2006). This lack of perception would also aided by the construction of the turbines in off-white to light grey materials, which would greatly minimize their visibility by allowing them to readily blend with the natural skyline and reflecting water (Cape Wind Associates LCC 2012). Further, currently existing developments, such as multi-story hotels, condos, casinos, and other commercial enterprises, as well as the natural formations such as the massive sand dunes were found to obscure and/or partially obscure sightlines to a number of the proposed turbines from historic properties. These conditions all contribute to minimizing and/or eliminating the magnitude of change that the proposed turbines will have on the setting, association, and feel of the historic properties (Department of Trade and Industry 2006).

Decommissioning

Based on Phase I cultural resources investigations in the terrestrial and marine environments, no significant cultural resources have been identified within the Project area. Consequently, similar to the construction phase there would be no effect to historic properties eligible for or listed on the National and/or State Register of Historic Places.

Conclusions

The DOE, in consultation with the USACE, the USCG, the Tribes, the SHPO and other consulting parties, has determined that the Proposed Project will have no adverse effect to historic properties eligible for or listed on the National Register of Historic Places.

3.5.3 No Action Alternative

Under the No-Action Alternative, no construction, operations and maintenance, or decommissioning activities would occur. Existing conditions would remain the same, and therefore, there would be no effect to historic properties eligible for or listed on the National and/or State Register of Historic Places for submarine and/or terrestrial cultural resources.

Figure 14. View of the 2nd story balcony of the Raphael-Gordon House facing southeast, with an overlay of the potential turbines (from AMEC 2010, 2015).

3.6 Socioeconomics

3.6.1 Affected Environment

3.6.1.1 Demographics and Environmental Justice

The casino industry sets Atlantic City apart from other municipalities in Atlantic County. The city serves as a major job location for the County and southern New Jersey (New Jersey Department of Transportation 2008). The US Census Bureau 2010 data report estimates that the total population of Atlantic City is 39,558. The population structure is described below in **Tables 3-10, 3-11, 3-12,** and **3-13** and compared with that of greater Atlantic County.

Table 3-10. Atlantic City Population Structure

Population	Atlantic City		Atlantic County	
	2010 Count	2010 Percentage	2010 Count	2010 Percentage
Population by Race				
American Indian and Alaska native	242	0.61%	1,050	0.38%
Asian	6,153	15.55%	20,595	7.50%
Black or African American	15,148	38.29%	44,138	16.08%
Native Hawaiian and other Pacific native	18	0.05%	92	0.03%
Some other race	5,549	14.03%	20,218	7.36%
Two or more races	1,905	4.82%	8,890	3.24%
White	10,543	26.65%	179,566	65.40%
Hispanic or Latino Origin				
Persons of Hispanic or Latino origin	12,044	30.45%	46,241	16.84%
Persons not of Hispanic or Latino origin	27,514	69.55%	228,308	83.16%
Gender				
Male	19,396	49.03%	133,175	48.51%
Female	20,162	50.97%	141,374	51.49%
Age				
Persons 0 to 4 Years	3,079	7.78%	16,484	6.00%
Persons 5 to 17 Years	6,638	16.78%	47,404	17.27%
Persons 18 to 64 Years	24,805	62.71%	171,759	62.56%
Persons 65 Years and Over	5,036	12.73%	38,902	14.17%

Source: US Census Bureau 2010 (http://censusviewer.com/free-maps-and-data-links/).

Other persons-related data reported by the US Census Bureau in comparison to the State of New Jersey is as follows:

Table 3-11. Atlantic City Persons-Related Data

Data	Atlantic City	New Jersey
High School Graduate or Higher, Percent of Persons Age 25+, 2007-2011	70.9	87.6
Bachelor's Degree or Higher, Percent of Persons Age 25+, 2007-2011	15.6	35.0
Veterans, 2007-2011	2,052	472,716
Mean Travel Time to Work (Minutes), Workers Age 16+, 2007-2011	20.7	30.1
Housing Units, 2010	20,013	3,553,562
Homeownership Rate, 2007-2011	33.7	66.6
Housing Units in Multi-Unit Structures, Percent, 2007-2011	67.7	35.9
Median-value of Owner-Occupied Housing Units, 2007-2011	$223,900	$349,100
Households, 2007-2011	16,300	3,180,854
Persons per Household, 2007-2011	2.40	2.69
Per Capita Money Income in the Past 12 Months (2011 Dollars), 2007-2011	$19,840	$35,678
Median Household Income, 2007-2011	$28,526	$71,180
Persons Below Poverty Level, Percent, 2007-2011	29.3	9.4

Business-related data reported by the US Census Bureau in comparison to the State of New Jersey is as follows:

Table 3-12. Business Sector Data

Data	Atlantic City	New Jersey
Company Ownership		
Total Number of Firms, 2007	2,141	781,622
Black-Owned Firms, Percent, 2007	13.9	7.7
American Indian- and Alaska Native-owned Firms, Percent, 2007	<25 firms	0.4
Asian-owned Firms, Percent, 2007	N/A	8.7
Native Hawaiian and Other Pacific Islander-owned Firms, Percent, 2007	<25 firms	0.1
Hispanic-owned Firms, Percent, 2007	12.0	8.7
Women-owned Firms, Percent, 2007	19.4	27.3
Business Sectors		
Manufacturer's Shipments, 2007 ($1,000)	N/A	$116,608,094
Merchant Wholesaler Sales, 2007 ($1,000)	$70,865	$233,413,004
Retail Sales, 2007 ($1,000)	$554,035	$124,813,580
Retail Sales per Capita, 2007	$13,992	$14,453
Accommodation and Food Service Sales, 2007 ($1,000)	$5,602,533	$19,993,613

The following schools are located in the Atlantic City School District and within 5 miles of the Project area:

Table 3-13. Schools in Close Proximity to the Project Area

School Name	General Direction from the Huron Substation	Miles from the Huron Substation	Minutes Drive from the Huron Substation
Atlantic City High School 1400 North Albany Avenue Atlantic City, NJ 08401	West	4.14	11
Atlantic City High School East Campus 117 North Indiana Avenue Atlantic City, NJ 08401	South	1.19	4
Brighton Avenue School 30 North Brighton Avenue Atlantic City, NJ 08401	Southwest	1.98	7
Chelsea Heights School 4101 Filbert Avenue Atlantic City, NJ 08401	Southwest	3.09	10
Dr. Martin Luther King School 1700 Marmora Avenue Atlantic City, NJ 08401	West	0.28	1
New York Avenue School 411 North New York Avenue Atlantic City, NJ 08401	South	0.41	1
Pennsylvania Avenue School 201 North Pennsylvania Avenue Atlantic City, NJ 08401	Southeast	0.73	2
Richmond Avenue School 4115 Ventnor Avenue Atlantic City, NJ 08401	Southwest	2.68	9
Sovereign Avenue School 111 N. Sovereign Avenue Atlantic City, NJ 08401	Southwest	2.23	7
Texas Avenue School 2523 Arctic Avenue Atlantic City, NJ 08401	Southwest	1.94	6
Uptown Complex School 323 Madison Avenue Atlantic City, NJ 08401	East	1.26	4
Venice Park School 1600 Penrose Avenue Atlantic City, NJ 08401	Northwest	0.98	3

3.6.1.2 Commercial and Recreational Fisheries

A review of the NJDEP Prime Fishing Areas Map (**Figure 15**) revealed that the Proposed Project construction would not be located within any designated prime fishing area as depicted on this map. Further, the Proposed Project would only result in temporary impacts to the sea floor bathymetry and would not reduce the high fishery productivity of the area. As described in **Section 3.7.1.3**, the preliminary analysis in the ABSG Consulting, Inc. (2011) vessel collision study indicated that the Proposed Project would not alter the path of commercial fishing boats in order to avoid the proposed wind farm. However, a small portion of potential recreational fishing areas could potentially be impacted as the turbines may affect navigation of recreational boats in this area. The Proposed Project is anticipated to improve recreational, commercial hookline, and commercial pot fishing in the area due to the increase in hard surfaces underwater. The presence of only six turbines would have a minor effect on mobile gear fishing (e.g., bottoms trawls and dredges). Except for during construction, a mobile gear fishing ban is not being considered. Implementation of the Proposed Project would result in a minor improvement of habitat for fish, but fishermen would not be able to navigate their boats where the turbines are located.

3.6.2 Environmental Impacts Related to Socioeconomics

Construction Phase

The Proposed Project would be located offshore in an unpopulated area; therefore, construction of the Proposed Project would not be expected to have any impact, adverse or beneficial, on race, gender, age class, or the area schools.

Operations and Maintenance

The Proposed Project could either increase tourism into the Atlantic City area by adding an additional sight-seeing locale, or retain tourists already within Atlantic City for a longer duration of time based on the survey described in **Section 2.5**. Due to the small size of the Proposed Project it would not be expected to have a substantial impact on tourism or recreational boating. Additionally, as the Proposed Project would have negligible impacts on viewsheds (refer to **Section 3.5**, *Cultural Resources*) it is not anticipated that property values or homeownership rates would be impacted.

As the plant electrical output would not exceed 25-MW, short term operational curtailments are not anticipated to result in any adverse impacts to the distribution of power within the region. However, for those periods when the Project is curtailed, there would continue to be west to east congestion on the transmission system which could temporarily increase the locational marginal price of electricity. Further, as the level of curtailment is increased, the benefit of stable electrical energy costs from the Project would be reduced.

Therefore, there would be no expected adverse impacts as a result of the operations and maintenance of the Proposed Project.

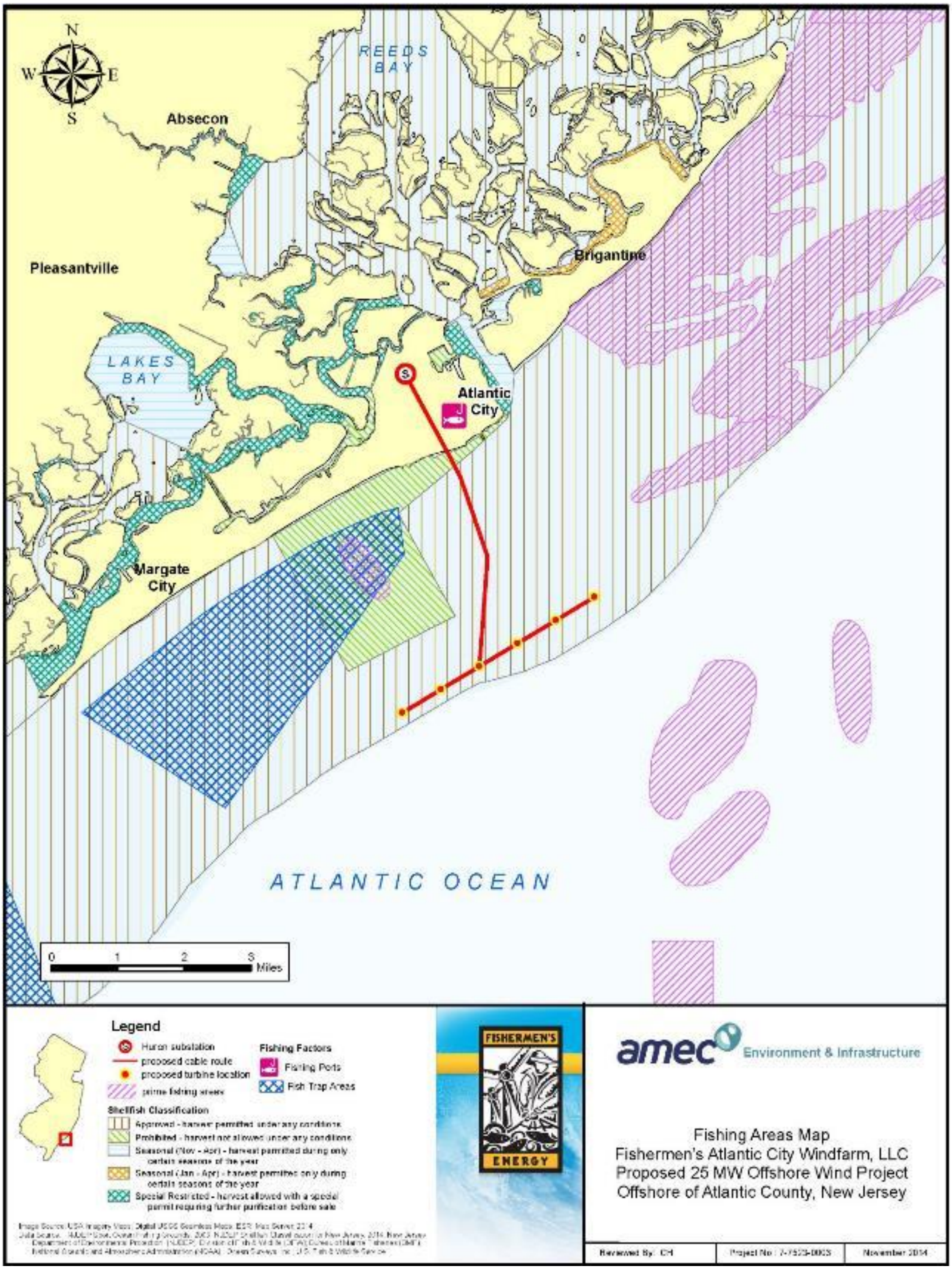

Figure 15. Fishing areas located in the vicinity of the Proposed Project.

Decommissioning

The Proposed Project would be located offshore in an unpopulated area; therefore, decommissioning of the Proposed Project would not be expected to have any impact, adverse or beneficial, on race, gender, age class, or the area schools.

3.6.3 No Action Alternative

Under the No-Action Alternative, no construction, operations and maintenance, or decommissioning activities would occur. Existing conditions would remain the same, and therefore, no impacts to socioeconomics or environmental justice would occur.

3.7 Infrastructure

The following section outlines infrastructure resources associated with the Proposed Project, including the substation to which the wind turbines ultimately would be connected.

3.7.1 Affected Environment

3.7.1.1 Solid Waste Disposal

The Proposed Project does not involve the construction of a solid waste disposal facility and solid wastes produced would be typical of a construction Project. The following solid waste facilities service the Atlantic City area or can accept solid wastes generated from the Proposed Project:

- Waste Management, Inc.
- IESI (Progressive Waste)
- Atlantic County Utilities Authority (ACUA), 6700 Delilah Road, Egg Harbor Township, NJ 08234
- Pinelands Park Solid Waste, 3024 Ocean Heights Avenue, Egg Harbor Township, NJ 08234
- Ocean County Landfill, 70 Station Road, Whiting, NJ 08759
- Cumberland County Solid Waste, 169 Jesse Bridge Road, Millville, NJ 08332
- Cumberland County Improvement Authority, 2 North High Street, Millville, NJ 08332
- Kinsley’s Landfill, Inc., 2025 Delsea Drive, Sewell, NJ 08080

3.7.1.2 Energy Sources

The Proposed Action involves the construction of an offshore wind farm, which would produce energy; however, the operations and maintenance as well as the decommissioning phase of the Proposed Project would also require the use of energy. Atlantic City Electric is the primary electric supplier to the City, although ratepayers may choose an electrical supplier of their own. South Jersey Gas is the primary natural gas supplier to the City.

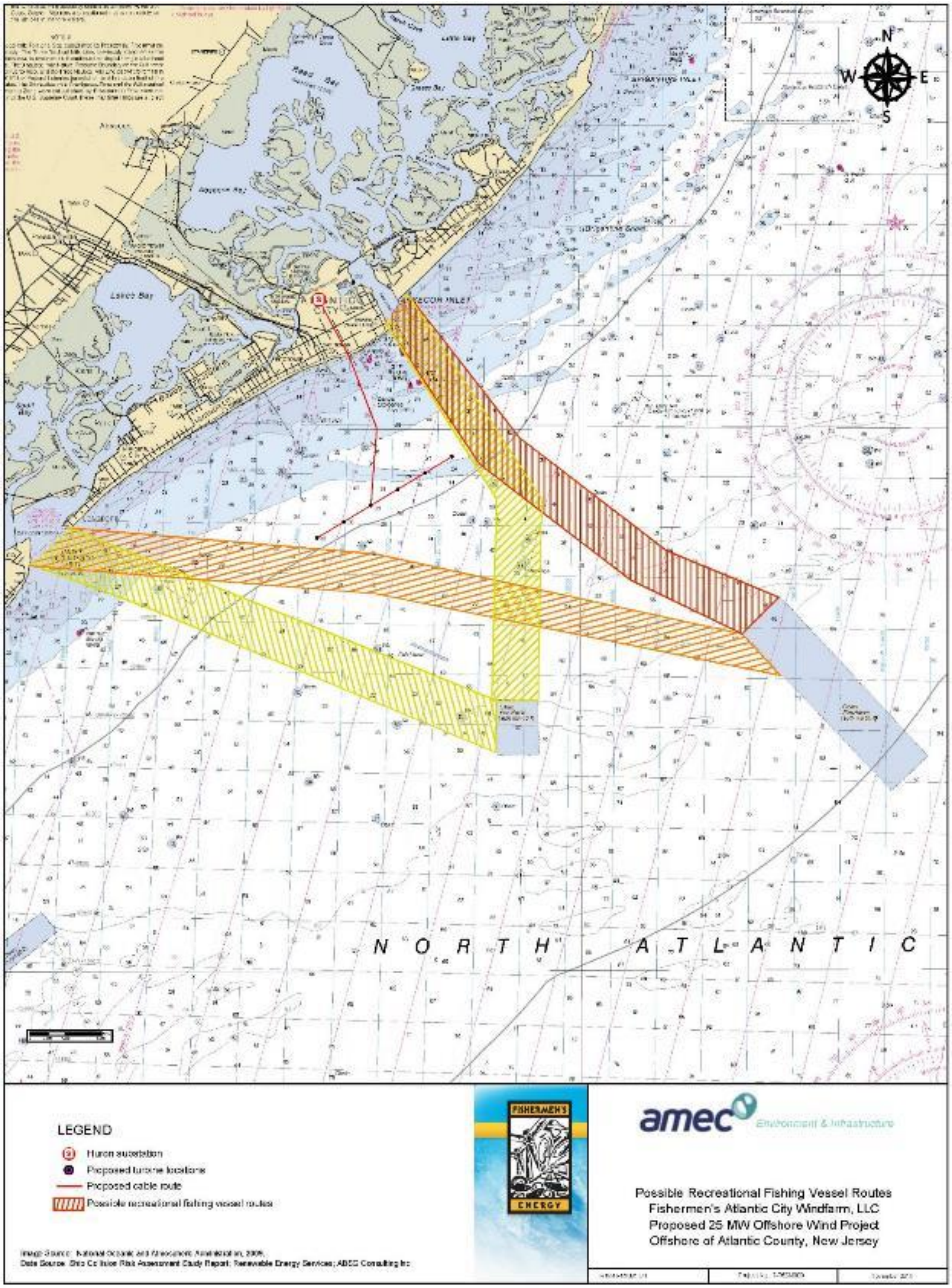

Image Source: National Oceanic and Atmospheric Administration, 2009.
Data Source: Ship Collision Risk Assessment Study Report; Renewable Energy Services; ABSG Consulting Inc

Figure 16. Potential Vessel Routes in the Vicinity of the Proposed Project.

3.7.1.3 Navigable Water Hazards

The Proposed Project would be located within waters of the Atlantic Ocean which has a depth sufficient for the safe navigation of boat traffic. Vessels that operated within the immediate vicinity of the Project area include recreational boats, medium sized cruise ships, and fishing boats. Commercial fishing vessels in the area of the wind farm do not fish near the platforms, but may pass within a mile of the proposed turbines (**Figure 16**; ABSG Consulting, Inc. 2011).

3.7.2 Environmental Impacts Related to Infrastructure

Construction Phase

The installation of the cable beneath the city streets may result in temporary, altered traffic patterns around the locations where access to the manholes would be established. These alterations are expected to be minor and would likely consist of traffic safety cones around the Project area that would divert traffic either around the work zone or to a side street.

A vessel collision study was prepared by ABSG Consulting, Inc. (2011) to determine the potential for vessel collisions at the Project site during construction and operation of the turbines. The study incorporated turbine and cable installation locations as well as data on vessel traffic and shipping lanes in the vicinity of the proposed wind farm. Together these were used to formulate the impact scenarios that could lead to collisions with the proposed wind turbines using the Center for Mine and Petroleum Technology, *A Guide to Quantitative Assessment for Offshore Installation*. During the construction phase of the Project, a potential collision between the construction vessel(s) and the platform could cause severe damage to the foundation and have the potential to damage or sink the construction vessel. This is an unlikely scenario. In addition, the vessel study determined that it is unlikely that the proposed wind farm would have a long-term detrimental impact on shipping activities in the area, as there are no major shipping lanes within several miles of the facility and there are no major port entry points near the facility (ABSG Consulting, Inc. 2011). While the New York Bight is one of the busiest waterways in the world, the merchant vessels that enter New York would be located more than 10 miles from the facility. There may be some minor impacts if the path of commercial fishing boats would need to be altered in order to avoid the proposed wind farm; however, preliminary analysis of fishing vessels routes does not indicate that this would be an issue (ABSG Consulting, Inc. 2011).

Therefore, adverse impacts associated with the construction phase of the Proposed Project would be short-term and minor.

Operations and Maintenance

The Proposed Project is expected to result in a slight increase in water use, waste water generation, and solid waste generation although these increases would not have an adverse effect upon any of these infrastructure systems.

Collisions between fixed offshore facilities and vessels can occur as a result of equipment failure on the vessel or human error on the part of the vessel. The operators of the proposed wind farm would not have control of the condition of the vessels in that area other than construction and maintenance vessels for the wind farm. However, the operators would take measures to ensure that the proposed turbines and maintenance vessel are easily seen by other vessels. The operators would provide a Notice to Mariners, which would include information regarding the activities at the wind farm to the maritime community. Additionally, lighting on the proposed turbines would alert vessels to the presence of the proposed wind farm. This would reduce the potential for reduced visibility collision (ABSG Consulting, Inc. 2011). The total ocean area considered as the Project area is approximately 170 acres (calculated as the perimeter around the group of six turbines, approximately 200 feet in each direction). Consequently, while the turbines would pose a navigational hazard the Project area is small and linear, and as such it could be easily avoided. There are also a number of applicant-committed measures (**Section 2.6**) that would be implemented that would reduce the likelihood of collisions.

In general the Proposed Project would have negligible long-term adverse impacts associated with infrastructure during the operations and maintenance phase.

Decommissioning

Decommissioning of the Proposed Project may result in temporary, altered traffic patterns in the vicinity of the buried cable. However, similar to the impacts described for the construction phase, these alterations are expected to be minor. Consequently, impacts associated with the decommissioning phase of the Proposed Project would be short-term and minor.

3.7.3 No Action Alternative

Under the No-Action Alternative, no construction, operations and maintenance, or decommissioning activities would occur. Existing conditions would remain the same, and therefore, no impacts to infrastructure would occur.

3.8 Summary of Environmental Impacts

A summary of environmental impacts by resource area is provided in **Table 3-14** below. The table describes the severity and duration (i.e., short-term or long-term) of environmental impacts for each resource area analyzed in detail within this EA.

Table 3-14. Summary of Environmental Consequences

Resource Area	Proposed Action	No Action Alternative
Physical Resources	--	--
Air Quality	⦸	○
Noise	⦸	○
Water Resources	⦸	○
Biological Resources	--	--
Marine Mammals and Sea Turtles	⦸	○
Birds and Bats	⦸	○

Table 3-14. Summary of Environmental Consequences

Resource Area	Proposed Action	No Action Alternative
Fisheries	⦸	○
Benthos	⦸	○
Cultural Resources	○	○
Socioeconomics	○	○
Infrastructure	⦸	○

Legend:
○ = No Impact
⊙ = Negligible, Minor, or Moderate Short-term Adverse Impact
⦸ = Negligible, Minor, or Moderate Long-term Adverse Impact
\+ = Beneficial Impact

3.9 Irreversible and Irretrievable Commitments of Resources

An irreversible commitment of resources is defined as the loss of future options. The term applies primarily to the effects of use of nonrenewable resources such as minerals or cultural resources. It could also apply to the loss of an experience as an indirect effect of a permanent change in the nature or character of the land. An irretrievable commitment of resources is defined as the loss of production, harvest, or use of natural resources. The amount of production foregone is irretrievable, but the action is not irreversible. If the use changes, it is possible to resume production (USDOE 2011).

Irreversible commitments of resources would be those consumed during construction, operations and maintenance, and decommissioning of the Project. These resources would include fossil fuels and construction materials, which would be committed for the life of the Project (USDOE 2011). Non-renewable fossil fuels would be lost through the use of gasoline and diesel-powered construction equipment during all phases of Project operations.

The Proposed Project is not expected to create any long-term or permanent losses of unique or irreplaceable areas. Any impacts resulting from the construction and operation are temporary and have been minimized to the extent practicable through the use of jacketed foundations for the turbines and a combination of jet-plowing and HDD for the submarine transmission cable. Removal of the turbines would restore the site for alternative uses, including all current uses. No loss of future ocean use options would occur.

3.10 The Relationship Between Local Short-Term Uses of the Human Environment and the Maintenance and Enhancement of Long-Term Productivity

Short-term use of the environment, as the term is used in this document, is that used during the life of the Project, whereas long-term productivity refers to the period of time after the Project has been decommissioned and the equipment removed. The short-term use of the Project site for the Proposed Project would not affect the long-term productivity of the Project area. When operation of the wind farm was no longer practicable, it would be decommissioned, removed and the site could be reclaimed for pre- Project uses.

SECTION 4
CUMULATIVE IMPACTS

Cumulative impacts to environmental resources result from the addition of incremental impacts from a proposed action to other past, present, and reasonably foreseeable future actions regardless of what agency, industry, or person undertakes the other actions (CEQ regulations 40 CFR Part 1508.7). Cumulative impacts can result from minor, but collectively substantial actions undertaken over a period of time by various agencies (federal, state, or local) or persons. In accordance with the NEPA, a discussion of potential cumulative impacts resulting from projects proposed, under construction, recently completed, or reasonably anticipated to be implemented is required. The Proposed Project would have the potential to result in long-term minor impacts to biological resources. All other long-term adverse impacts resulting from implementation of the Proposed Project would be negligible. Further, implementation of the Proposed Project would result in no major short-term adverse impacts.

4.1 Cumulative Projects

A review of recently completed and pending onshore projects within Atlantic City and federal, state, and local actions/projects offshore of New Jersey was completed in order to compile a cumulative project list. No relevant completed or pending onshore projects were identified; however, a number of offshore wind development actions were identified and are described in further detail below.

4.1.1 Recently Completed Projects

Jersey-Atlantic Wind Farm

The Jersey-Atlantic Wind Farm in Atlantic City, New Jersey was the first coastal wind farm in the US as well as the first wind farm in New Jersey. It became operational in March 2006 and consists of five 1.5 MW turbines constructed by General Electric. Each wind turbine reaches a height of 380 feet (State of New Jersey 2011).

The wind farm is located at the ACUA Wastewater Treatment Plant on US Route 30 and is visible from highways approaching Atlantic City. The turbines produce approximately 19 million kilowatt hours (kWh) of electricity per year, which is both used by the ACUA Wastewater Treatment Plant and delivered to the regional electric grid (ACUA 2014).

4.1.2 Programmatic Offshore Wind Development

Offshore Wind Economic Development Act

The Offshore Wind Economic Development Act was signed into state law on 19 August 2010. The Act amends and supplements the Electric Discount and Energy Competition Act by creating an offshore renewable energy certificate program and authorizing the New Jersey Economic Development Authority (EDA) to provide guaranteed income to offshore wind energy facilities. The Act also mandates the Board of Public Utilities (BPU) to establish an Offshore Wind Renewable Energy Certificate (OREC) program, requiring that a percentage of the kWh sold in New Jersey by each electric power supplier and each basic generation service provider derive from offshore wind energy in the Atlantic Ocean. The Act directs the BPU to develop a program to require that a percentage of electricity sold in the state be from offshore wind energy, to support at least 1,100 MW of generation from qualified offshore wind projects.

2011 New Jersey Energy Master Plan

The 2011 Energy Master Plan outlines the strategic vision for the use, management, and development of energy in New Jersey over the next decade. As required by state law, the Energy Master Plan includes long-term objectives and interim measures consistent with and necessary to achieving those objectives. To accomplish its goal of ensuring that New Jersey continues to have reliable energy at reasonable rates, the Governor released the Final 2011 Energy Master Plan in December 2011. The plan outlines goals and continued support for offshore wind development off of the New Jersey coastline (State of New Jersey 2011).

Atlantic Commercial Wind Lease Issuance

The Energy Policy Act of 2005 (Public Law [PL] No. 109-58), added subsection 8(p)(1)(C) to the Outer Continental Shelf Lands Act (OCSLA), which grants the Secretary of the Interior the authority to issue leases, easements, or rights-of-way on the OCS for the purpose of renewable energy development, including wind energy development. On 23 November 2010, the Secretary of the Interior announced the “Smart from the Start” Atlantic wind energy initiative to facilitate the responsible development of wind energy on the Atlantic OCS. This initiative calls for the identification of areas of the Atlantic OCS that appear most suitable for commercial wind energy activities, while presenting the fewest apparent environmental and user conflicts. These areas are known as Wind Energy Areas (WEAs) (BOEM 2012a).

In consultation with other federal agencies and BOEM’s Intergovernmental Renewable Energy Task Forces, BOEM identified WEAs offshore New Jersey, Delaware, Maryland, and Virginia. BOEM prepared an EA (2012) that analyzed the reasonably foreseeable consequences associated with two distinct BOEM actions in the WEAs: (1) Lease issuance (including reasonably foreseeable consequences associated with shallow hazards, geological, geotechnical, and archaeological resource surveys); and (2) Site Assessment Procedures (SAP) approval (including reasonably foreseeable consequences associated with the installation and operation of a meteorological tower and/or meteorological buoys).[9] The proposed lease area of the offshore New Jersey begins 7 nautical miles from the shore and extends roughly 23 nautical miles seaward (or to the approximate 100 foot depth contour) as well as 53 nautical miles along the federal/state boundary from Seaside Park to Hereford Inlet. The entire area is approximately 418 square nautical miles and contains approximately 43 whole OCS blocks and 126 partial blocks (BOEM 2012a).

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[9] Additional analysis under NEPA will be required before any future decision is made regarding construction or operation of any wind energy facility on leases that may be issued within the WEAs.

The Finding of No Significant Impact (FONSI) for the BOEM 2012a EA referenced above was signed on 20 January 2012. In July 2014, the DOI and the BOEM proposed sale of leases in the New Jersey WEA for nearly 344,000 acres covering an area approximately 7 miles off the coast of Atlantic City (BOEM 2014). The comment period on the proposal ended on 19 September 2014 (Federal Register [FR] Vol. 79 No. 139).

4.1.3 Pending Offshore Wind Projects

In addition to the programmatic policy, guidelines, and actions there are a number of proposed and pending offshore wind development projects along the Atlantic coastline. These developments are described in detail below.

Block Island Wind Farm

The Block Island Wind Farm, which recently received final permit approval from the USACE, is a 30 MW offshore wind farm to be located approximately 3 miles southeast of Block Island, Rhode Island consisting of five turbines. The approved wind farm will be located entirely in Rhode Island state waters and will generate over 125,000 megawatt hours (Mwh) annually. Power will be exported to the mainland electric grid via the 21-mile, bi-directional Block Island Transmission System, a submarine cable proposed to make landfall in Narragansett, Rhode Island. Deepwater Wind plans to begin transmission construction as early as 2014 and offshore construction in 2015 (Deepwater Wind 2014).

Impacts resulting from construction and operations of the Block Island Wind Farm would be similar to those described for the Proposed Project, as the Block Island Wind Farm would be similar in size and capacity.

Deepwater ONE

Deepwater ONE is proposed to be located in the Atlantic Ocean on the OCS approximately 30 miles east of Montauk, New York and nearly 15 miles southwest of Martha’s Vineyard in Massachusetts. Most of the turbines associated with this Project will be located more than 20 miles from land (Deepwater Wind 2014).

In 2013, Deepwater Wind won the exclusive right to develop the 256 square mile Deepwater ONE site. Deepwater ONE is planned as a 150 to 200 turbine Project with an approximate capacity of 900 to 1,200 MW. Deepwater Wind plans to sell the electricity generated from Deepwater ONE to Long Island and to New England states including Rhode Island, Massachusetts, and Connecticut. Deepwater Wind would pair Deepwater ONE with a new regional transmission system to deliver energy to multiple markets. The New England-Long Island Interconnector (NELI) would for the first time link Long Island electrically to southern New England, increasing system reliability in both regions and enabling the delivery of utility-scale offshore wind power (Deepwater Wind 2014).

Atlantic Wind Connection

The proposed Atlantic Wind Connection is an offshore, undersea transmission line that would span the mid-Atlantic region, beginning in northern New Jersey and eventually extending to southern Virginia. The transmission line would connect wind farms that are built in the federally-designated WEAs (refer to discussion above) at least 10 miles off the coast. The Atlantic Wind Connection Project would be constructed in phases over a 10 year period, with Phase 1: New Jersey Energy Link completed in 2020 (Atlantic Wind Connection 2014).

Using advanced transmission technology, the Atlantic Wind Connection would be able to move offshore wind electricity from where it is generated to where it is needed. When the winds are calm and the wind farm output drops, the line would be used to move conventional energy resources efficiently from places where there is surplus power to places where the demand. In addition, the grid along the coast is generally weak, and building a high-capacity cable paralleling the coast would strengthen the grid and make it more reliable. When complete, this multi-phased Project would support the development of up to 6,000 MW of offshore wind energy (Atlantic Wind Connection 2014).

4.2 Cumulative Impacts

Activities likely to occur offshore of New Jersey during the life of the Proposed Project (i.e., up to 25 years) include:

1) Ongoing military, commercial (including fishing and trawling), and recreational vessel traffic;
    a. Impacts from these activities considered in the cumulative analysis include:
        i. Increased vessel traffic and associated effluent discharges, air emissions, and noise;
        ii. Increases of accidental releases of trash and marine debris
2) Other offshore renewable energy projects (described above).
    a. The Proposed Project could incrementally contribute to cumulative impacts associated with these recently approved or proposed projects. However, due to the small scale of the Proposed Project, adverse impacts to biological resources, water quality, geology and soils would be negligible or minor and would not contribute substantially to cumulative impacts.

Ongoing Vessel Traffic

Vessel Traffic

As described in **Section 3.6.1.2** the Proposed Project construction would not be located within any designated prime fishing areas. Further, the ABSG Consulting, Inc. (2011) vessel collision study indicated that the Proposed Project would not alter the path of commercial fishing boats in order to avoid the proposed wind farm. Therefore, the Proposed Project would not contribute to any cumulative effects on fishing and trawling vessels.

Annual vessel trips resulting from the Proposed Project would be minimal and would be further reduced following the construction of the proposed turbines (approximately one vessel per week for maintenance).

Effluent Discharges

Potential discharges and bottom disturbances from anchoring associated with Proposed Project vessel traffic would be negligible relative to discharges from ongoing vessel traffic and bottom disturbances due to vessel anchoring. Impacts associated with the construction phase of the Proposed Project would be minor and short term, and impacts associated with operations and maintenance phase of the Proposed Project would be negligible as only one vessel per week would be required to maintain the turbines. Consequently, the Proposed Project would not contribute substantially to potential cumulative impacts affecting water quality or associated indirect impacts to biologically sensitive resources.

Air Emissions

As described in **Section 3.2.2.1**, air emissions associated with the Proposed Project during construction and decommissioning would be minor and short term. Further, air emissions associated with operations and maintenance of the proposed turbines would be negligible as only one vessel trip per week would be required to maintain the turbines. Consequently, the Proposed Project would not contribute to any cumulative effects on air quality.

Noise

Offshore, the impacts of additional vessel traffic generated by the Proposed Project would likely be undetectable compared to the number of military, commercial, and recreational vessel trips projected to occur during the life of the Proposed Project. A Minerals Management Service (MMS) study estimates that over an approximately year period military, commercial and recreational vessel trips in the area will number in the millions (MMS 2007). Given these numbers, the increase in vessel traffic generated by the Proposed Project (at approximately one vessel trip per week) would be minimal. Consequently, noise generated from vessel trips associated with the Proposed Project would not contribute substantially to cumulative impacts.

Offshore Renewable Energy Projects

Biological Resources

As described in **Section 3.4**, the Proposed Project would have minor impacts to biological resources, including marine mammals and sea turtles, birds and bats, fisheries, and benthic organisms. The cumulative projects in **Section 4.1**, would have similar impacts to these resources during the construction, operations and maintenance, and decommissioning phases. The sounds of pile-driving and vessels during construction of the proposed turbines would be clearly audible to marine mammals and sea turtles as well as fish species in the vicinity of the Project area and transit routes. During construction activities, vessel traffic bringing equipment and personnel to offshore construction sites may indirectly affect marine mammals and sea turtles as well as fish species. Additionally, operation of the turbines may result in displacement of birds and bats or a small number of collisions. However, while fatalities resulting from collisions with turbines could occur they would be very unlikely as surveys conducted between 2007 and 2010 showed that few of the species observed spent more than a few minutes or hours within the area where the turbines would be located. Additionally, the proposed turbines occupy only a very small portion of the area from 2 to 3 nautical miles from shore. Examining only the area covered by turbine rotors coverage is equal to about 0.3 percent of the area 2 to 3 nautical miles from shore between Longport and Brigantine (GMI and Curry & Kerlinger 2011).

The Proposed Project may represent an incremental contribution to cumulative minor adverse impacts to marine mammals and sea turtles, fisheries, birds and bats, and benthic organisms when added to the existing renewable energy facility in Atlantic City or the other reasonably foreseeable future projects. Cumulative impacts to these species would be similar to those described for the Proposed Project, but compounded by pending or approved projects with similar impacts. However, because of the small scale of the Proposed Project it is anticipated that cumulative impacts to marine mammals and sea turtles, fisheries, birds and bats, and benthic organisms would be negligible. Cumulative impacts of the Proposed Project would be negligible because there are no past, present, or reasonable foreseeable future actions that, when combined with the Proposed Project, would result in impacts beyond those that already exist or have already been identified and discussed in **Section 3.4**.

Water Quality

As described in **Section 3.3**, the Proposed Project would have minor impacts on water quality resulting from sediment suspension and potential for hazardous materials spills. The cumulative projects in **Section 4.1**, would have similar impacts to these water quality during the construction, operations and maintenance, and decommissioning phases. The installation of the turbine foundations using a pile driving hammer would result in localized suspension of bottom sediment. The installation of submarine cables would also result in localized sediment suspension. However, the impacts to water quality would be minimal and temporary as natural sediment build up would allow the ocean to maintain the marine ecosystems it supports. Further, the likelihood of hazardous materials spills during the construction, operations and maintenance, and decommissioning phases of the Proposed Project would relatively low and the volume and relative area that could be impacted would be small. Such spills would be unlikely to measurably affect water quality. Consequently, the Proposed Project would not contribute to any cumulative impacts related to water quality.

Geology and Soils

As described in Section 3.2.2, the Proposed Project would not result in any adverse impacts to geology and soils. Consequently, the Proposed Project would not contribute to any cumulative impacts related to these resources.

SECTION 5
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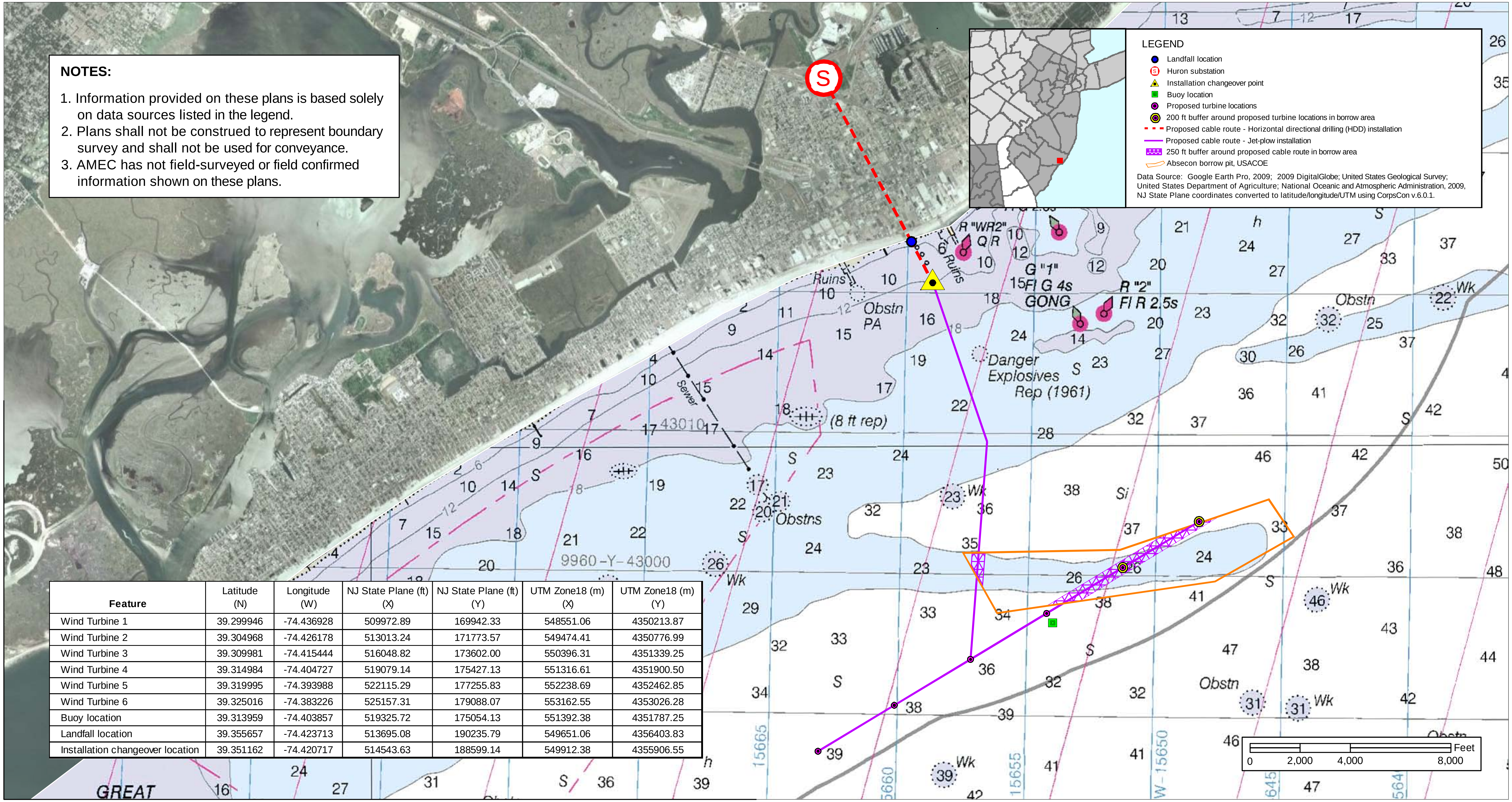
SECTION 6
LIST OF PREPARERS

Species biology, presence, and effects determinations for this EA were prepared using data and information assembled by several biologists, including Paul Kerlinger, Ph.D. from Curry & Kerlinger, LLC; Ross Rasmussen, Tony Leukering, Christopher Clark, and Greg Rosier from GeoMarine, Inc.; and Chuck Harman, P.W.S. and Christy L. Benes, B.S. from Amec Foster Wheeler Environment and Infrastructure, Inc.. In addition, Dawn L. Johnson, Ph.D. and Nicholas Meisinger from Amec Foster Wheeler assisted with the development of this EA. Other preparers of the EA include Stephen O’Malley, Stan White, and Aviv Goldsmith from FACW. Lori Gray from the US Department of Energy reviewed this EA.

APPENDIX A

OVERALL SITE PLAN AND DESIGN DETAILS



NOTES:

1. Information provided on these plans is based solely on data sources listed in the legend.
2. Plans shall not be construed to represent boundary survey and shall not be used for conveyance.
3. AMEC has not field-surveyed or field confirmed information shown on these plans.

LEGEND

- ● Landfall location
- Ⓢ Huron substation
- ▲ Installation changeover point
- 🟩 Buoy location
- ◉ Proposed turbine locations
- ◎ 200 ft buffer around proposed turbine locations in borrow area
- - - - Proposed cable route - Horizontal directional drilling (HDD) installation
- — Proposed cable route - Jet-plow installation
- ▨ 250 ft buffer around proposed cable route in borrow area
- ▱ Absecon borrow pit, USACOE

Data Source: Google Earth Pro, 2009; 2009 DigitalGlobe; United States Geological Survey; United States Department of Agriculture; National Oceanic and Atmospheric Administration, 2009, NJ State Plane coordinates converted to latitude/longitude/UTM using CorpsCon v.6.0.1.

Feature	Latitude (N)	Longitude (W)	NJ State Plane (ft) (X)	NJ State Plane (ft) (Y)	UTM Zone18 (m) (X)	UTM Zone18 (m) (Y)
Wind Turbine 1	39.299946	-74.436928	509972.89	169942.33	548551.06	4350213.87
Wind Turbine 2	39.304968	-74.426178	513013.24	171773.57	549474.41	4350776.99
Wind Turbine 3	39.309981	-74.415444	516048.82	173602.00	550396.31	4351339.25
Wind Turbine 4	39.314984	-74.404727	519079.14	175427.13	551316.61	4351900.50
Wind Turbine 5	39.319995	-74.393988	522115.29	177255.83	552238.69	4352462.85
Wind Turbine 6	39.325016	-74.383226	525157.31	179088.07	553162.55	4353026.28
Buoy location	39.313959	-74.403857	519325.72	175054.13	551392.38	4351787.25
Landfall location	39.355657	-74.423713	513695.08	190235.79	549651.06	4356403.83
Installation changeover location	39.351162	-74.420717	514543.63	188599.14	549912.38	4355906.55

NOT FOR CONSTRUCTION

REVISIONS

NO.	DESCRIPTION	BY	DATE

SEAL:

WILLIAM J. MIKULA
N.J. PROFESSIONAL ENGINEER
ENGINEER NO. 24GE04051500

CLIENT:

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ATLANTIC CITY, NEW JERSEY 08401

amec Environment & Infrastructure

751 ARBOR WAY, SUITE 180
BLUE BELL, PA 19422-1960
NEW JERSEY CERT. OF AUTH. NO. 24GA28010900

285 DAVIDSON AVENUE, SUITE 450
SOMERSET, NJ 08873-4153

PROJECT

FISHERMEN'S ATLANTIC CITY WINDFARM, LLC
25 MW OFFSHORE WINDFARM

TITLE

OVERALL SITE PLAN

DATE: 11/27/2014

PROJECT NO: 775230003.0200

SCALE: AS SHOWN

SHEET No. 1 of 1

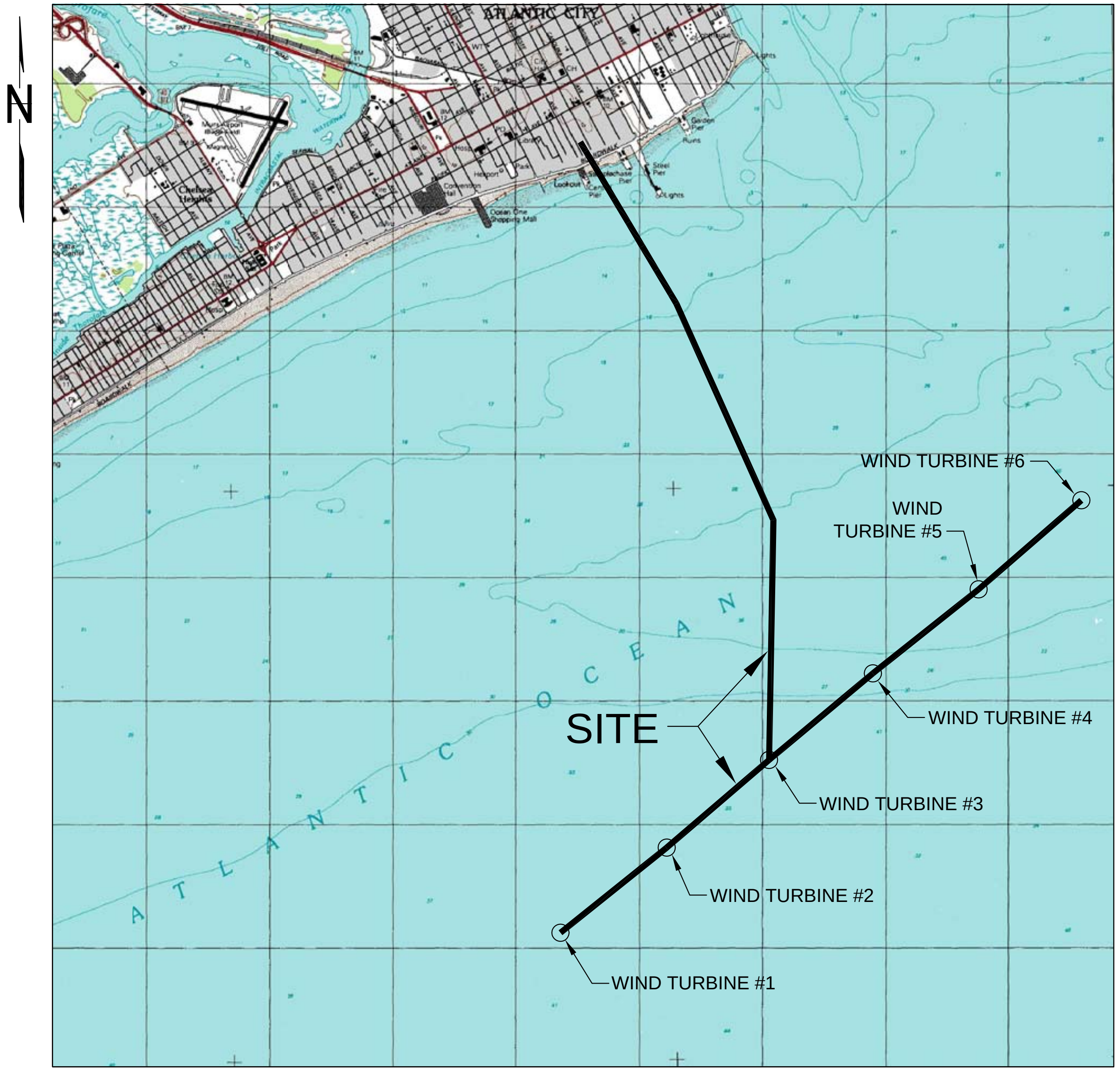
FISHERMEN'S ATLANTIC CITY WINDFARM , LLC

25MW OFFSHORE WINDFARM

OFFSHORE ATLANTIC COUNTY, NEW JERSEY

AMEC PROJECT NO. 775230003

MAY 5, 2010 (REVISION 4 - DECEMBER 1, 2014)



SOURCE: USGS QUADRANGLE MAP, 7.5 MIN SERIES
ATLANTIC CITY, NJ 1994

SITE LOCATION MAP

SHEET INDEX

SHEET NO.	DESCRIPTION	DWG. NO.
1	COVER SHEET / INDEX	
2	INDEX PLAN - KEY PLAN	C-1
3	CABLE TO HURON SUBSTATON PLAN AND PROFILE STA. 0+00 TO 60+00	C-2
4	CABLE TO HURON SUBSTATION PLAN AND PROFILE STA. 60+00 TO 120+00	C-3
5	CABLE TO HURON SUBSTATION PLAN AND PROFILE STA. 120+00 TO 180.21	C-4
6	INTERCONNECT CABLE PLAN AND PROFILE STA. 200+00 TO 260+00	C-5
7	INTERCONNECT CABLE PLAN AND PROFILE STA 260+00 TO 320+00	C-6
8	INTERCONNECT CABLE PLAN AND PROFILE STA 320+00 TO 377.50	C-7

NOT FOR CONSTRUCTION

NO.	ISSUE / REVISION DESCRIPTION	BY	DATE
4	CHANGED PROFESSIONAL ENGINEER	WM	12-01-14
3	REROUTED SUPPLY CABLE TO TURBINE #3	RM	04-19-11
2	REROUTED SUPPLY CABLE TO TURBINE #3	RM	10-22-10
1	PER ARMY CORP COMMENTS	MM	08-09-10

PROJECT:
20MW OFF SHORE WINDFARM
ATLANTIC CITY, NEW JERSEY

TITLE:
COVER SHEET / INDEX

SEAL:

WILLIAM J. MIKULA
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NEW JERSEY CER. OF
AUTH. NO. 24GA28010900

DESIGNED BY: DA	DRAWN BY: RJB
CHECKED BY: RM	DATE: DECEMBER 2014
SCALE: AS SHOWN	REVISION: 4

PROJECT NUMBER:
775230003

DRAWING NUMBER:

SHEET NUMBER:
1 OF 8

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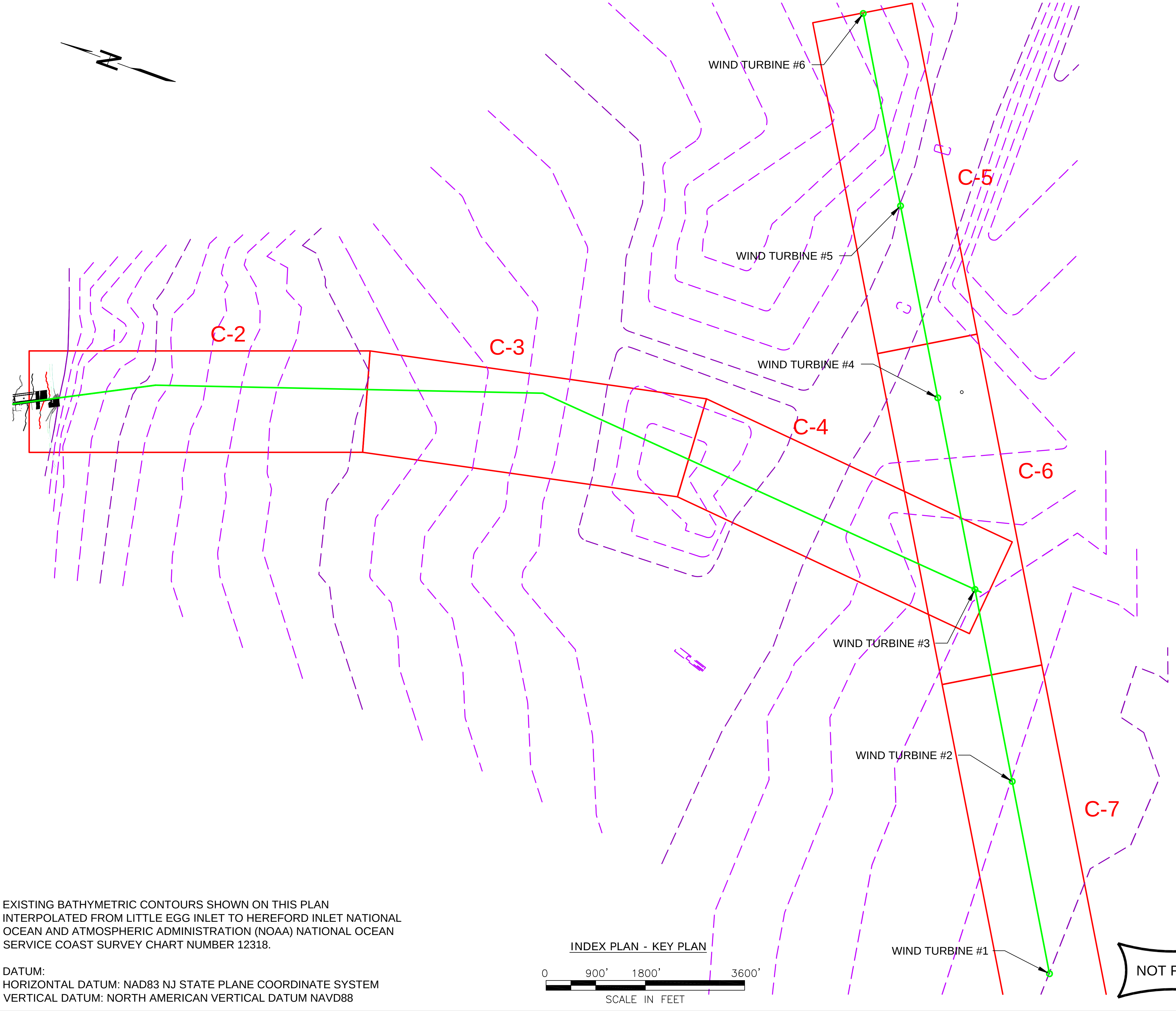

INDEX PLAN - KEY PLAN

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DATUM:
HORIZONTAL DATUM: NAD83 NJ STATE PLANE COORDINATE SYSTEM
VERTICAL DATUM: NORTH AMERICAN VERTICAL DATUM NAVD88

NOT FOR CONSTRUCTION

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3	REROUTED SUPPLY CABLE TO TURBINE #3	RM	04-19-11
2	REROUTED SUPPLY CABLE TO TURBINE #3	RM	10-22-10
1	PER ARMY CORP COMMENTS	MM	08-09-10

PROJECT:
20MW OFF SHORE WINDFARM
ATLANTIC CITY, NEW JERSEY

TITLE:
INDEX PLAN - KEY PLAN

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NEW JERSEY CER. OF
AUTH. NO. 24GA28010900

DESIGNED BY: DA	DRAWN BY: RJB
CHECKED BY: RM	DATE: DECEMBER 2014
SCALE: AS SHOWN	REVISION: 4

PROJECT NUMBER:
775230003

DRAWING NUMBER:
C-1

SHEET NUMBER:
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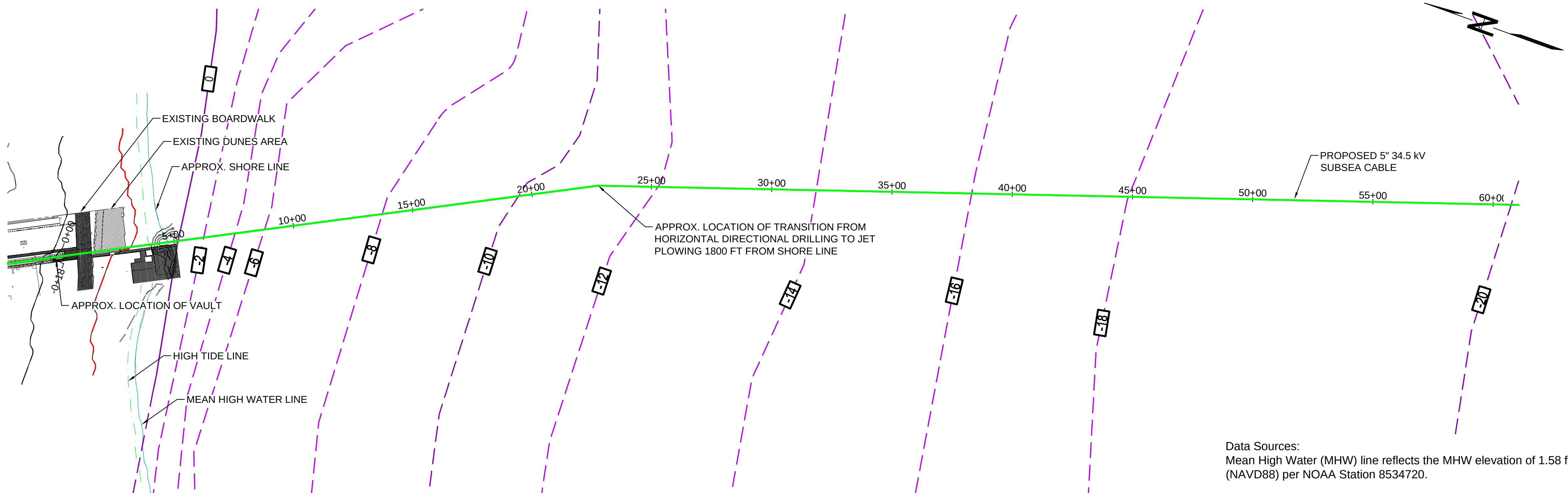

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CABLE TO HURON SUBSTATION PLAN FROM STA 0+00 TO STA 60+00

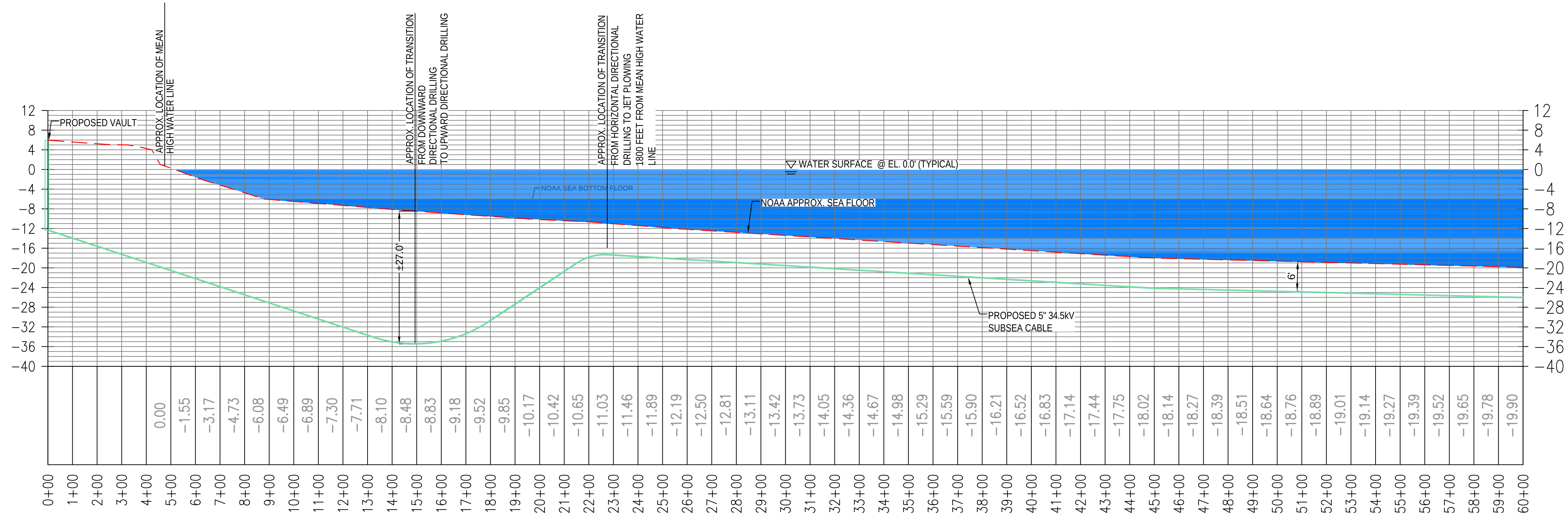
0 250' 500' 1000'

SCALE IN FEET

Data Sources:
Mean High Water (MHW) line reflects the MHW elevation of 1.58 feet (NAVD88) per NOAA Station 8534720.

High Tide Line (HTL) reflects the highest predicted lunar tide limit elevation for 2004, which was established by USACE at 3.12 NAVD88.

MHW line and HTL were developed using USACE Absecon Island, New Jersey Beach Profile Data, dated December 2003.



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Vert. Scale : 1" = 25'

NOT FOR CONSTRUCTION

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3	REROUTED SUPPLY CABLE TO TURBINE #3	RM	04-19-11
2	REROUTED SUPPLY CABLE TO TURBINE #3	RM	10-22-10
1	PER ARMY CORP COMMENTS	MM	08-09-10

PROJECT:
20MW OFF SHORE WINDFARM
ATLANTIC CITY, NEW JERSEY

TITLE:
CABLE TO HURON SUBSTATON
PLAN AND PROFILE
STA. 0+00 TO 60+00

SEAL:

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NEW JERSEY CER. OF
AUTH. NO. 24GA28010900

DESIGNED BY: DA	DRAWN BY: RJB
CHECKED BY: RM	DATE: DECEMBER 2014
SCALE: AS SHOWN	REVISION: 4

PROJECT NUMBER:
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DRAWING NUMBER:
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SHEET NUMBER:
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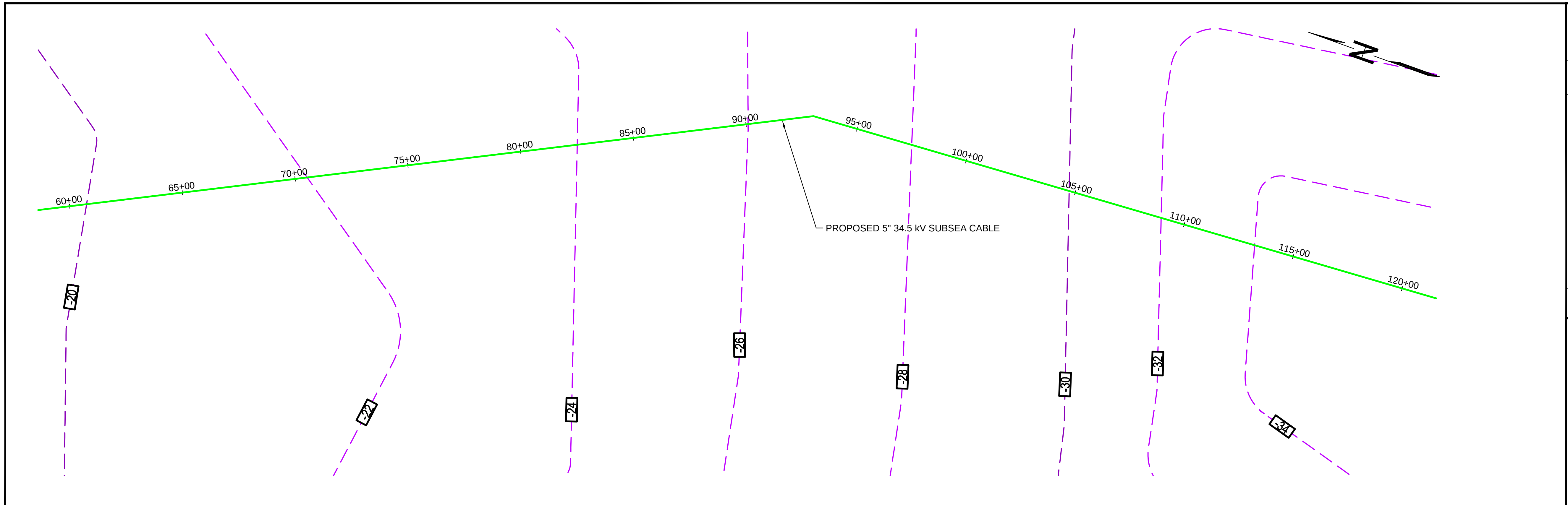

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INTERPOLATED FROM LITTLE EGG INLET TO HEREFORD INLET
NATIONAL OCEAN AND ATMOSPHERIC ADMINISTRATION (NOAA)
NATIONAL OCEAN SERVICE COAST SURVEY CHART NUMBER 12318.

CABLE TO HURON SUBSTATION PLAN FROM STA 60+00 TO STA 120+00

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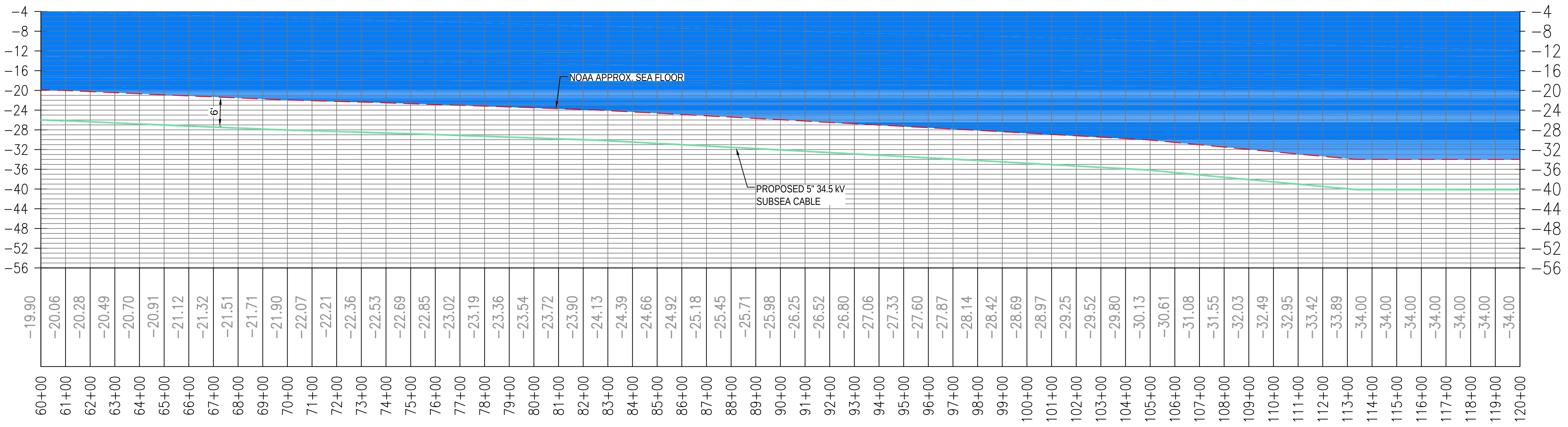

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2	REROUTED SUPPLY CABLE TO TURBINE #3	RM	10-22-10
1	PER ARMY CORP COMMENTS	MM	08-09-10

PROJECT:
20MW OFF SHORE WINDFARM
ATLANTIC CITY, NEW JERSEY

TITLE:
CABLE TO HURON SUBSTATON
PLAN AND PROFILE
STA. 60+00 TO 120+00

SEAL:

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AUTH. NO. 24GA28010900

DESIGNED BY: DA	DRAWN BY: RJB
CHECKED BY: RM	DATE: DECEMBER 2014
SCALE: AS SHOWN	REVISION: 4

PROJECT NUMBER:
775230003

DRAWING NUMBER:
C-3

SHEET NUMBER:
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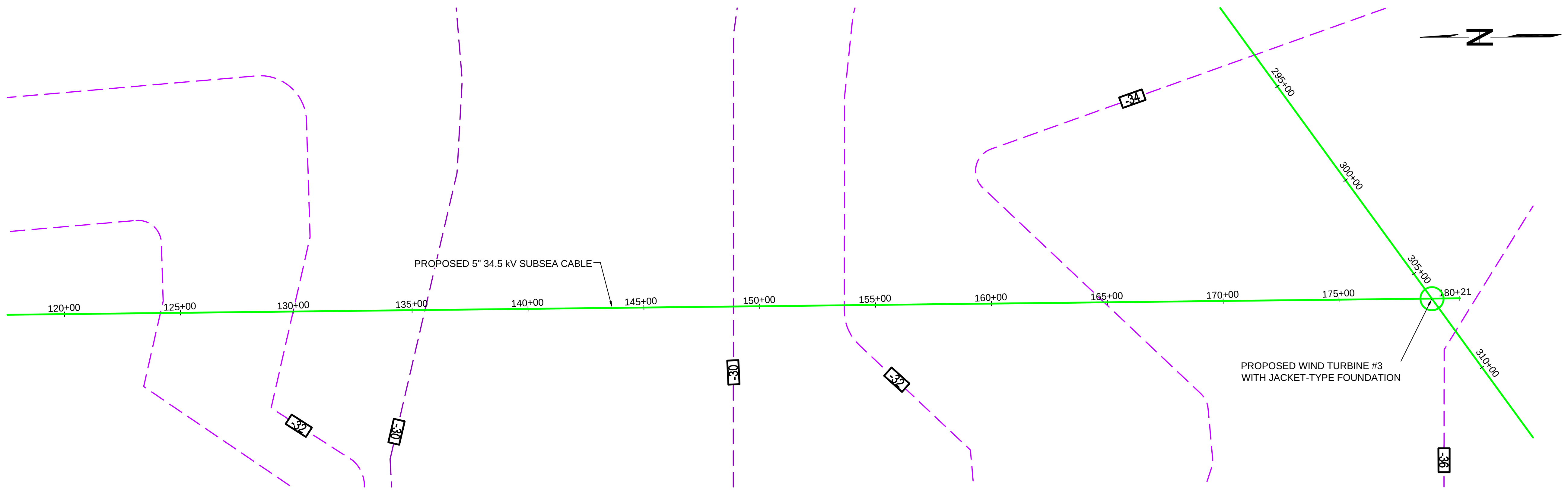

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CABLE TO HURON SUBSTATION PLAN FROM STA 120+00 TO STA 180+21

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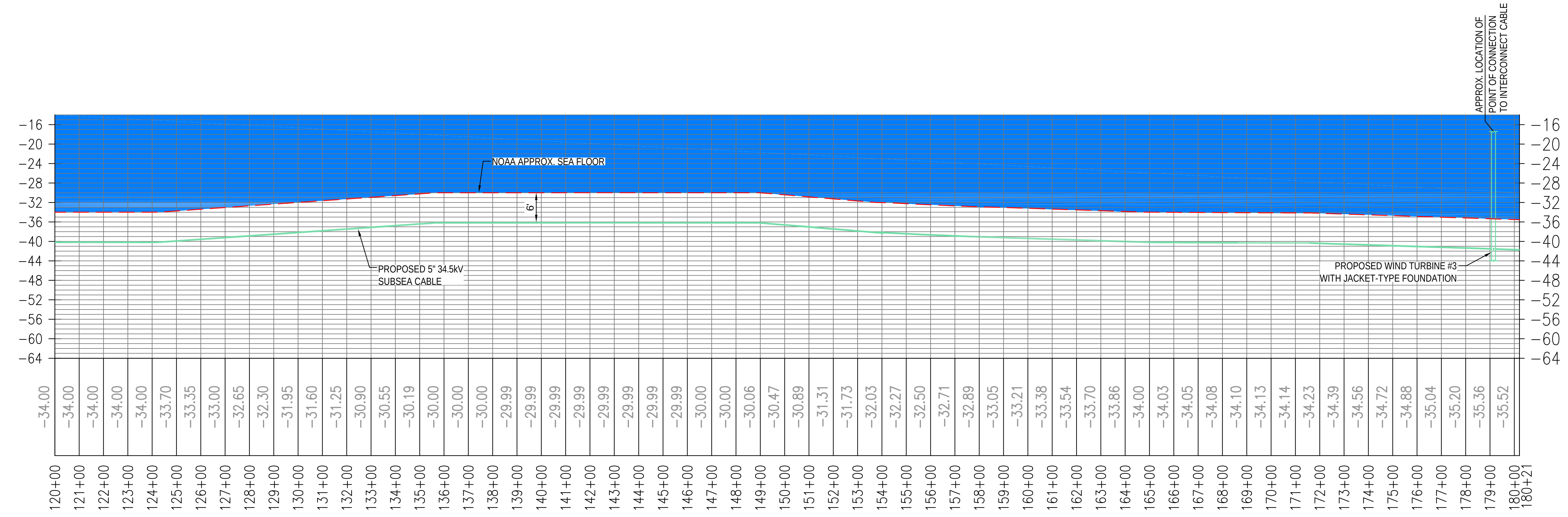

CABLE TO HURON SUBSTATION PROFILE FROM STA 120+00 TO STA 180+21
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NOT FOR CONSTRUCTION

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1	PER ARMY CORP COMMENTS	MM	08-09-10

PROJECT:
20MW OFF SHORE WINDFARM
ATLANTIC CITY, NEW JERSEY

TITLE:
CABLE TO HURON SUBSTATON
PLAN AND PROFILE
STA.120+00 TO 180.21

SEAL:

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AUTH. NO. 24GA28010900

DESIGNED BY: DA	DRAWN BY: RJB
CHECKED BY: RM	DATE: DECEMBER 2014
SCALE: AS SHOWN	REVISION: 4

PROJECT NUMBER:
775230003

DRAWING NUMBER:
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SHEET NUMBER:
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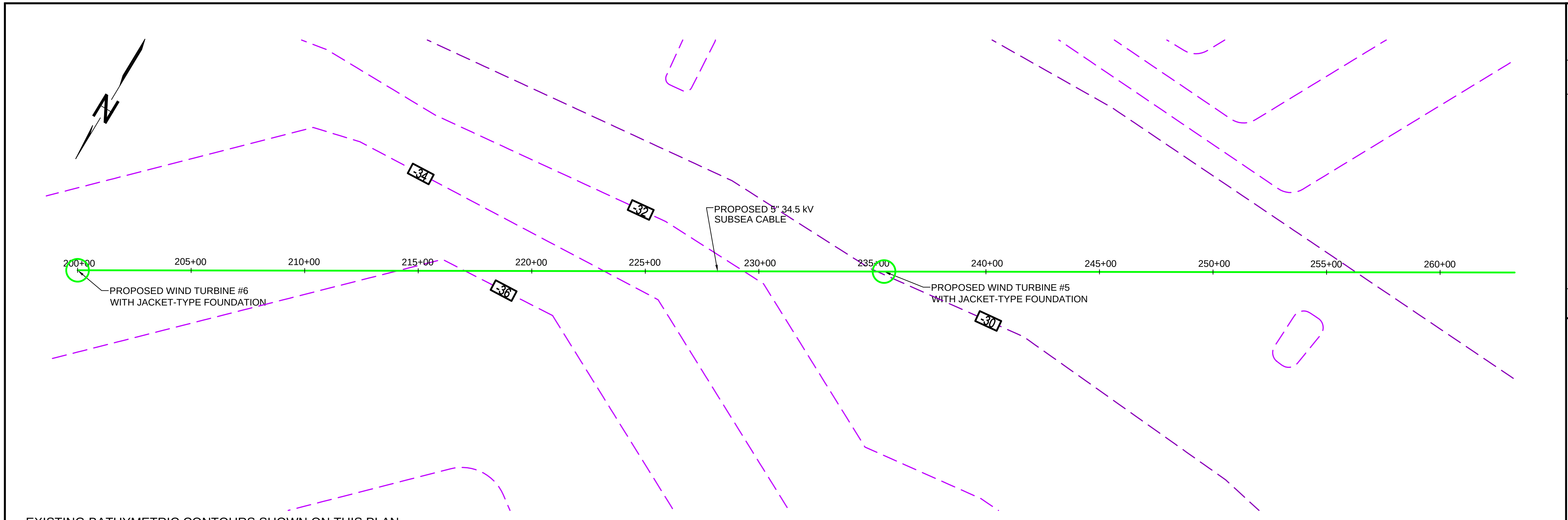

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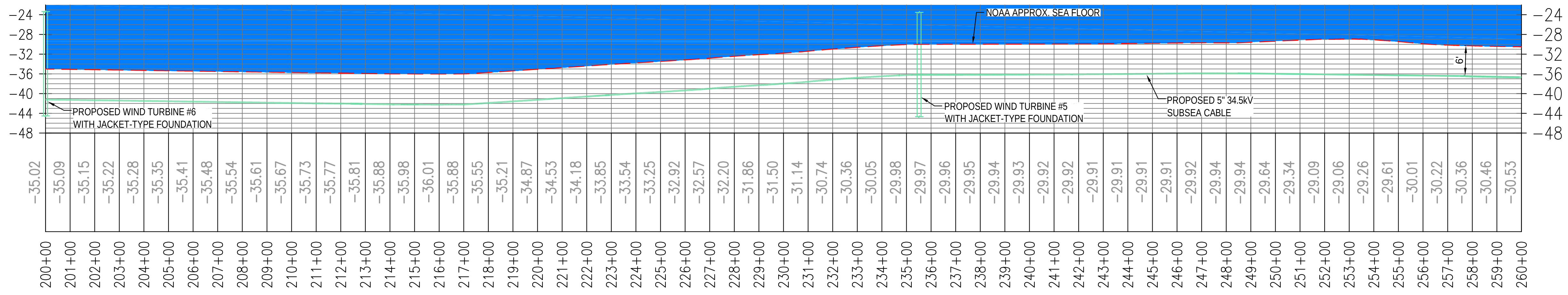
NATIONAL OCEAN AND ATMOSPHERIC ADMINISTRATION (NOAA)
NATIONAL OCEAN SERVICE COAST SURVEY CHART NUMBER 12318.

INTERCONNECT PLAN FROM STA 200+00 TO STA 260+00

0 250' 500' 1000'

SCALE IN FEET



INTERCONNECT PROFILE FROM STA 200+00 TO STA 260+00

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1	PER ARMY CORP COMMENTS	MM	08-09-10

PROJECT:
20MW OFF SHORE WINDFARM
ATLANTIC CITY, NEW JERSEY

TITLE:
INTERCONNECT CABLE PLAN
AND PROFILE STA. 200+00 TO 260+00

SEAL:

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NEW JERSEY CER. OF
AUTH. NO. 24GA28010900

DESIGNED BY: DA	DRAWN BY: RJB
CHECKED BY: RM	DATE: DECEMBER 2014
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PROJECT NUMBER:
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SHEET NUMBER:
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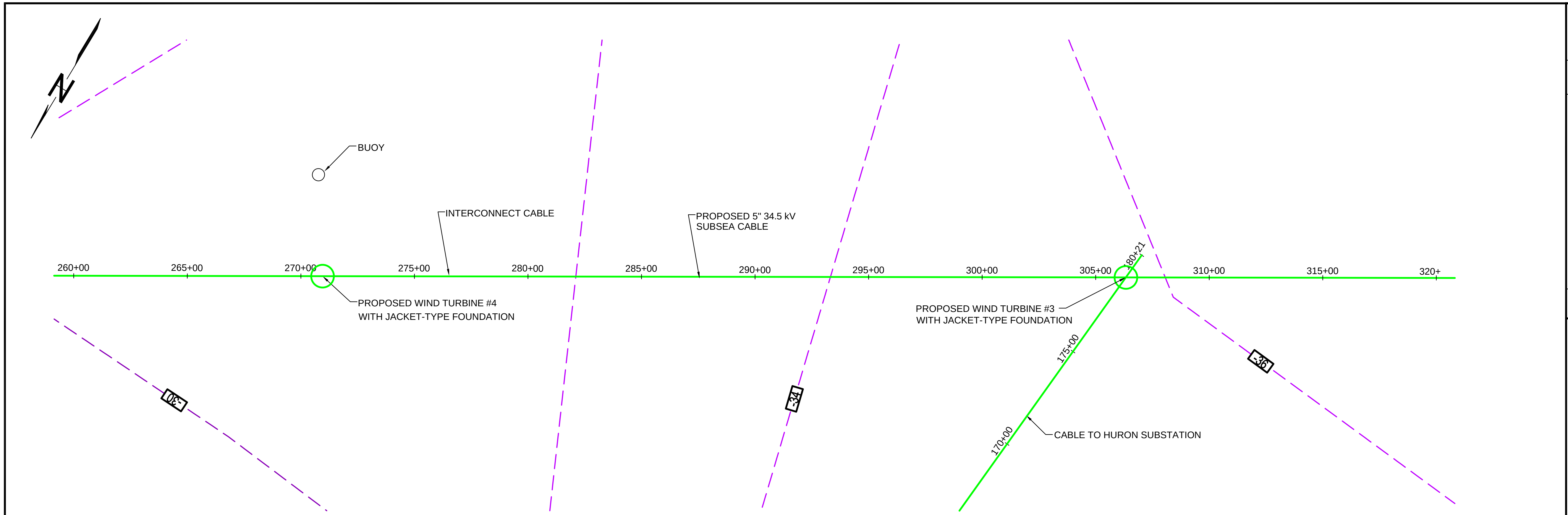

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INTERCONNECT PLAN FROM STA 260+00 TO STA 320+00

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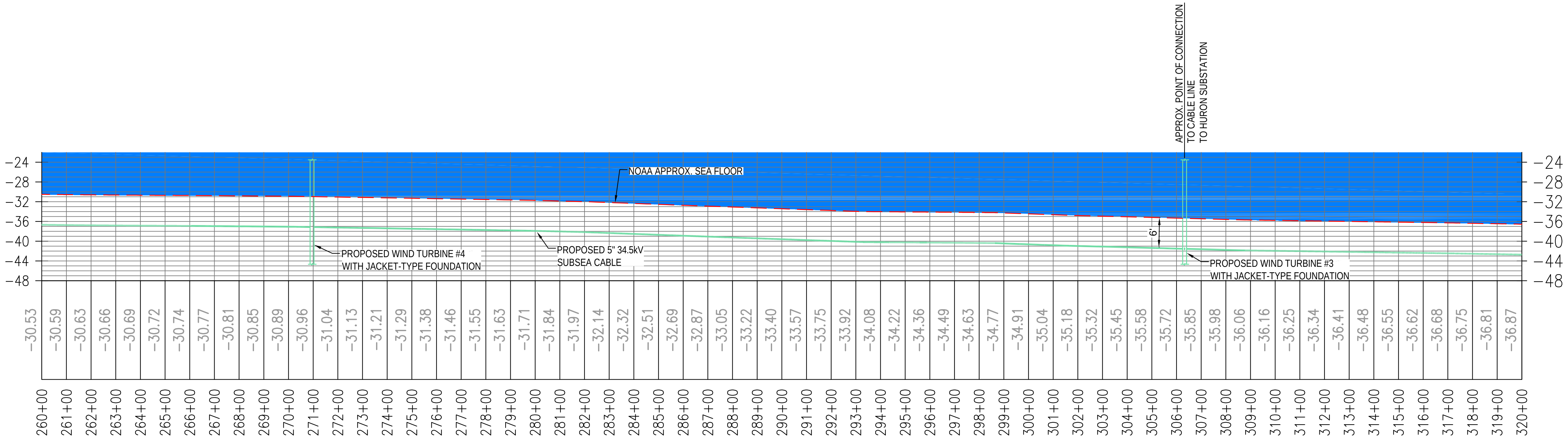
SCALE IN FEET



INTERCONNECT PROFILE FROM STA 260+00 TO STA 320+00
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NOT FOR CONSTRUCTION

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2	REROUTED SUPPLY CABLE TO TURBINE #3	RM	10-22-10
1	PER ARMY CORP COMMENTS	MM	08-09-10

PROJECT:
20MW OFF SHORE WINDFARM
ATLANTIC CITY, NEW JERSEY

TITLE:
INTERCONNECT CABLE PLAN AND PROFILE STA. 260+00 TO 320+00

SEAL:

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ENGINEER NO. 24GE04051500

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NEW JERSEY CER. OF
AUTH. NO. 24GA28010900

DESIGNED BY: DA	DRAWN BY: RJB
CHECKED BY: RM	DATE: DECEMBER 2014
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PROJECT NUMBER:
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C-6

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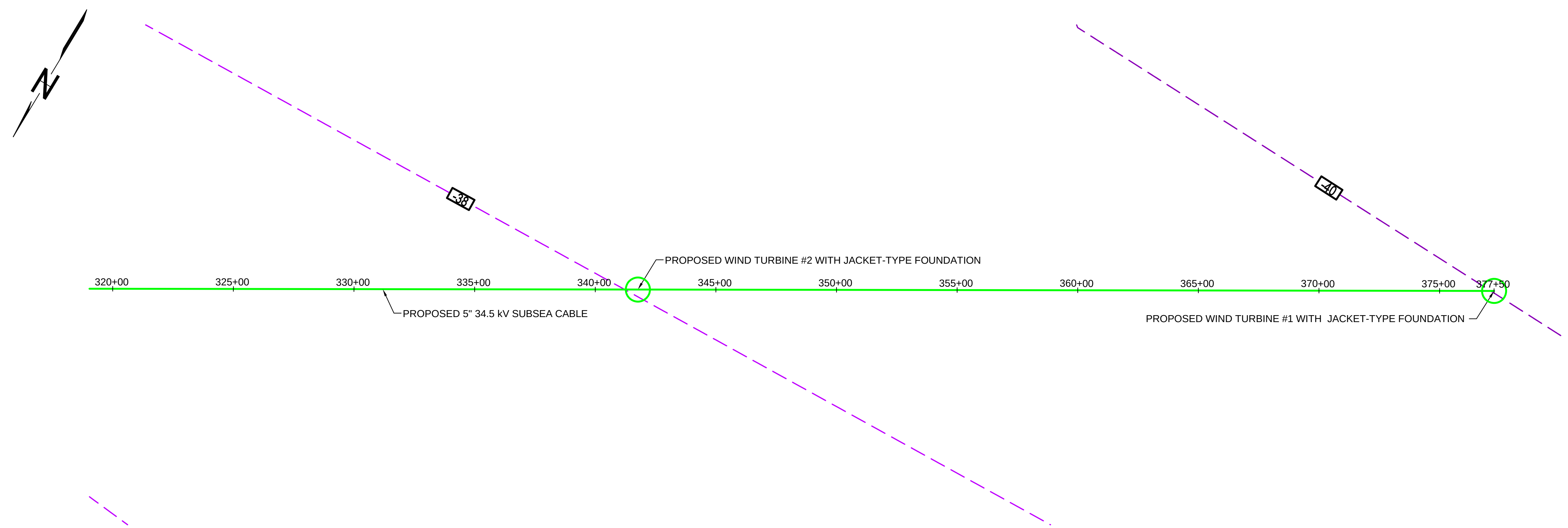

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NATIONAL OCEAN SERVICE COAST SURVEY CHART NUMBER 12318.

INTERCONNECT CABLE PLAN FROM STA 320+00 TO STA 377+50

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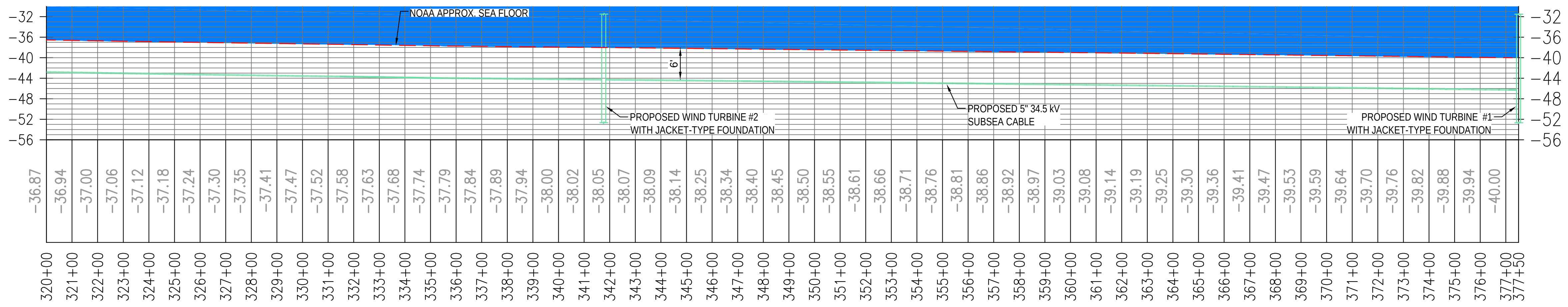
SCALE IN FEET



INTERCONNECT CABLE PROFILE FROM STA 320+00 STA 377+50
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1	PER ARMY CORP COMMENTS	MM	08-09-10

PROJECT:
20MW OFF SHORE WINDFARM
ATLANTIC CITY, NEW JERSEY

TITLE:
INTERCONNECT CABLE PLAN
AND PROFILE STA.320+00 TO 377+50

SEAL:

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NEW JERSEY CER. OF
AUTH. NO. 24GA28010900

DESIGNED BY: DA	DRAWN BY: RJB
CHECKED BY: RM	DATE: DECEMBER 2014
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DRAWING NUMBER:
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SHEET NUMBER:
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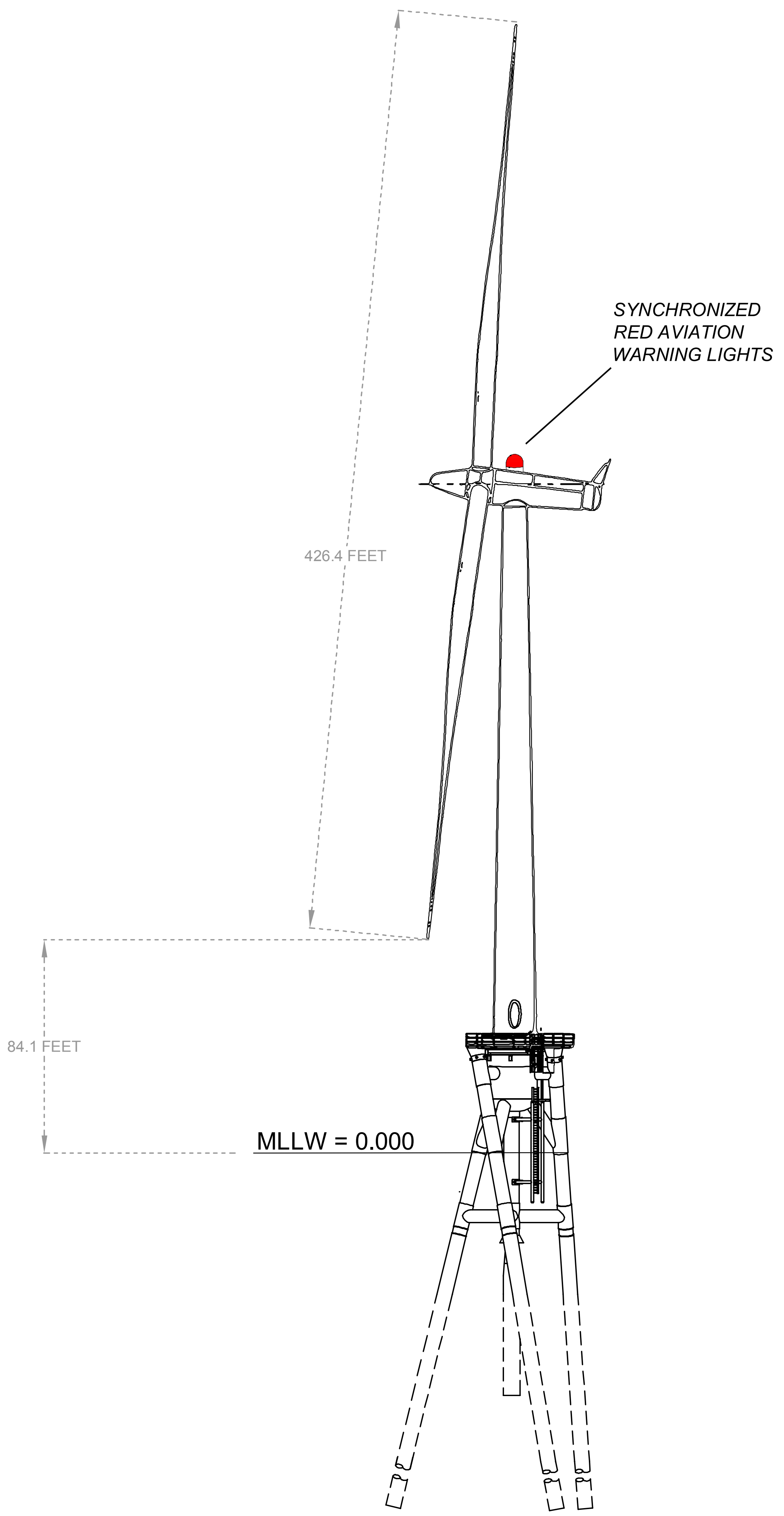
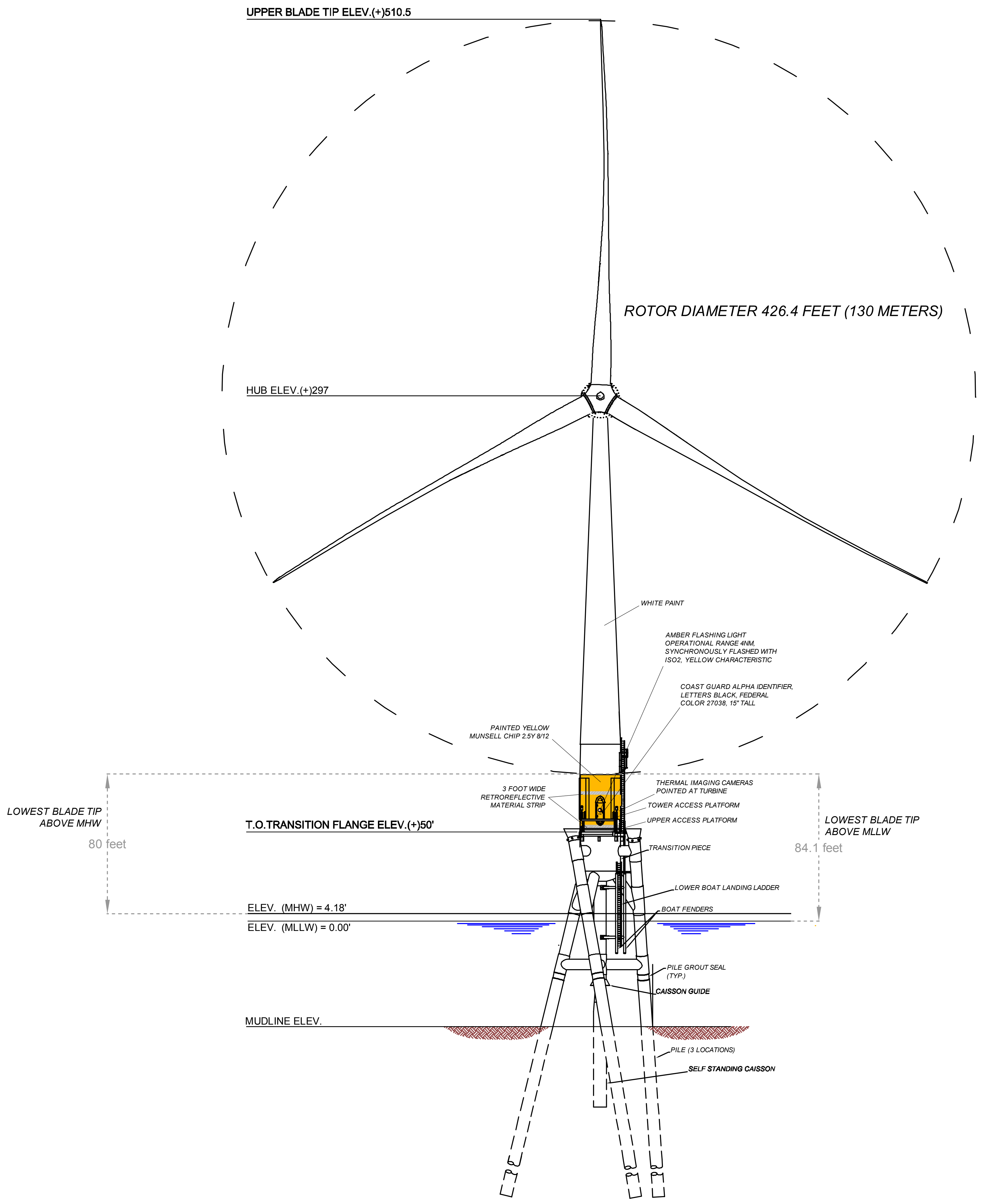




CLIENT

FISHERMEN'S ATLANTIC CITY WINDFARM, LLC

AMEC Environment & Infrastructure
285 DAVIDSON AVENUE, SUITE 405
SOMERSET, NEW JERSEY 08873

amec

DWN BY: PJK

CHK'D BY: CH

DATUM: 775230003

APPROXIMATE SCALE: N.T.S.

PROJECT

25MW OFF SHORE WIND PROJECT
ATLANTIC CITY, NEW JERSEY

TITLE

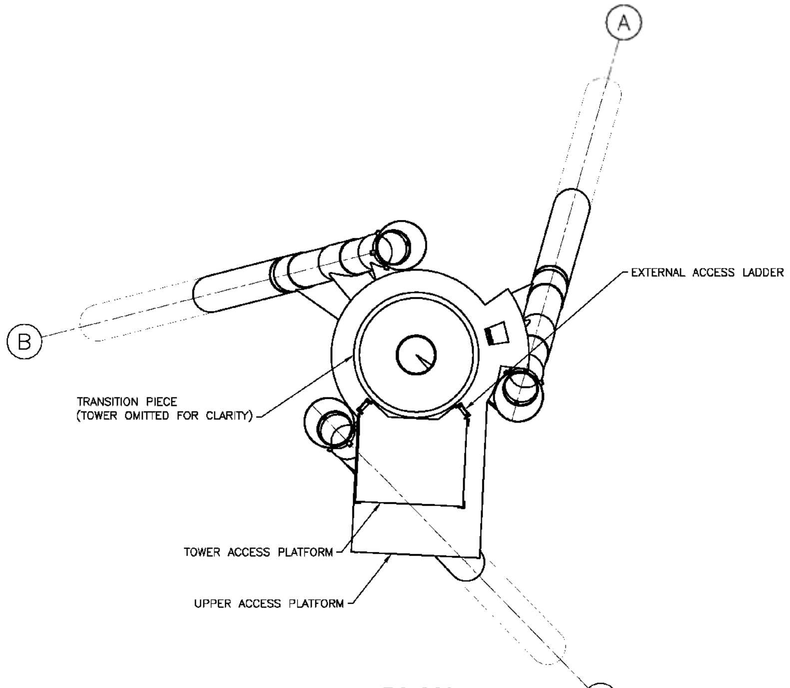
WIND TURBINE DETAIL

REV. NO.: 0

DATE: DECEMBER 4, 2014

PROJECT NO: -

FIGURE No. 1



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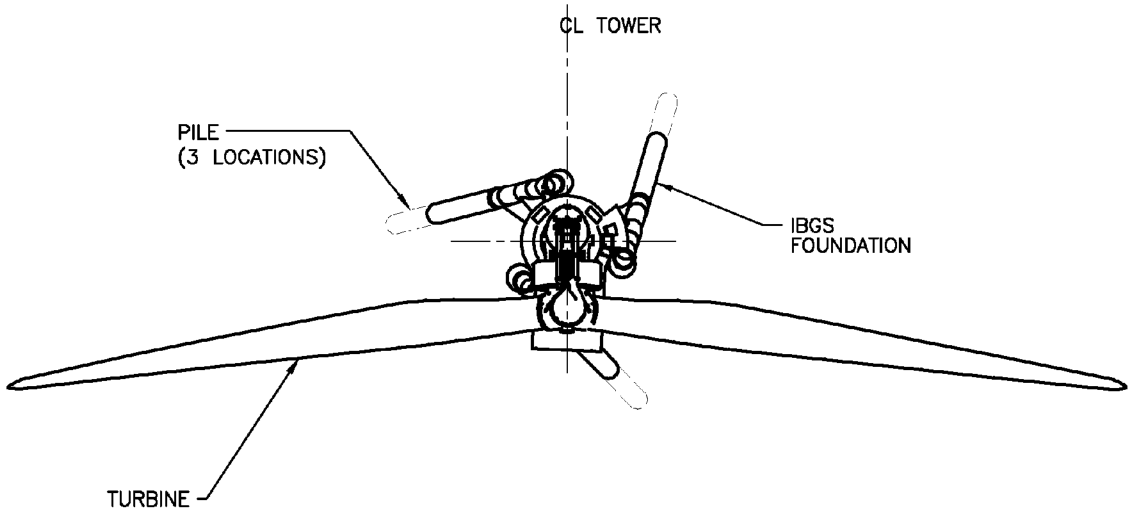

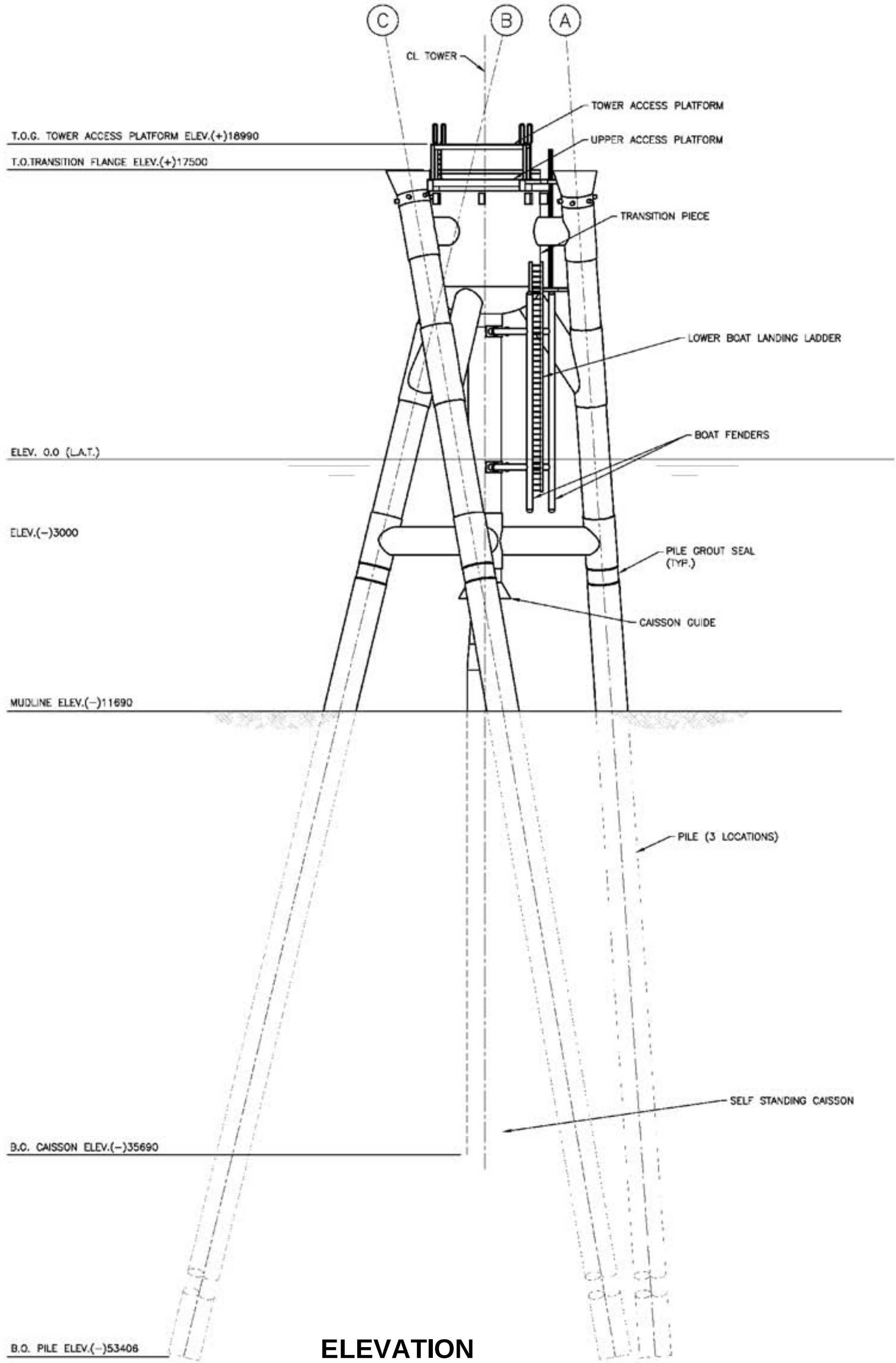

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SOURCE
Keystone Engineering, Inc.
2014

CLIENT
FISHERMEN'S ATLANTIC CITY WINDFARM, LLC

DWN BY: PJK
CHK'D BY: CH
DATUM: 775230003
APPROXIMATE SCALE: N.T.S.

PROJECT
25MW OFF SHORE WIND PROJECT
ATLANTIC CITY, NEW JERSEY

REV. NO.: 0
DATE: NOVEMBER 18, 2014
PROJECT NO: -
FIGURE No. 1

TITLE
WIND TURBINE DETAIL

AMEC Environment & Infrastructure
285 DAVIDSON AVENUE, SUITE 405
SOMERSET, NEW JERSEY 08873

APPENDIX B

POST-CONSTRUCTION MONITORING AND WORK PLAN

POST-CONSTRUCTION AVIAN, BAT, AND MARINE MAMMAL STUDIES
FISHERMEN'S ENERGY STATE WATERS WIND POWER PROJECT

PREPARED FOR:

Fishermen's Energy of New Jersey, LLC

Prepared By:

Geo-Marine, Inc.
2201 K Avenue, Suite A2
Plano, Texas 75074

and

Curry & Kerlinger, L.L.C.
P.O. Box 453
Cape May Point, NJ 08212

and

North East Ecological Services ('NEES')
52 Grandview Road
Bow, NH 03304
(603) 228-9308

January 10, 2012

TABLE OF CONTENTS

APPENDICES

LIST OF FIGURES

1.0 Purpose of the Study

This Post-Construction Monitoring Work Plan is being submitted pursuant to the conditions of N.J. Department of Environmental Protection (NJDEP) Permit 0102-09-0024.2 (CAF 100001; WFD 100001, and CTD 100001), and the associated U.S. Army Corps of Engineers (USACOE) 404 Individual permit application. The purpose of this study is to support Fishermen's Energy of New Jersey, LLC (Fishermen's), sponsor of the Fishermen's Atlantic City Offshore Wind Farm, LLC, with post-construction ecological studies in support of its wind energy facility to be located approximately 2.8 nautical miles (NM) off the coast of New Jersey. The goal is to provide geographical information system (GIS), as well as spatial and temporal data analysis for various species potentially utilizing the offshore waters of the Atlantic Ocean surrounding the wind farm (the Project Study Area) as part of a two-year post-construction program.

The scope of the study includes data collection for the presence/absence, distribution, abundance and migratory patterns of avian, bat, marine mammal, sea turtle, and other marine species in the Project Study Area. The Post-Construction Monitoring Program includes all study components in the Pre-Construction Monitoring Program initiated by Fishermen's in 2010 and a study component for monitoring avian and bat collision mortality during turbine operation. Six month interim reports would be completed during the two year post-construction monitoring period, with a final summary report provided to the NJDEP and the USACOE at the completion of the 2 years of operation.

2.0 Project Study Area

Post-construction monitoring will be conducted by Geo-Marine, Inc. (GMI) on behalf of Fishermen's within the confines of the Project Study Area, which is defined as the waters off the coast of New Jersey starting from Absecon Inlet, extending south to Margate City, and continuing out to approximately 4 NM offshore. Seven survey track lines, spaced 1 NM apart, have been created to collect data on birds, marine mammals and sea turtles. The Project Study Area includes a 1.5-NM buffer zone surrounding the proposed turbine locations (**Figure 1**). Key components of the project include a planned transmission line that runs from onshore near Atlantic City under Tennessee Avenue, the Boardwalk, the beach, and out to approximately 2.8 NM offshore. The wind turbines will be constructed parallel to the shoreline at Atlantic City at approximately 2.8 NM offshore.

3.0 Study Objectives

Data collected for this study will provide the state with detailed, site specific data for the Project Area that will enable comparison of changes between preconstruction and post-construction behavior and use of the Project Area by birds, bats, marine life, and commercial and recreational users. Biological target (bird and bat) wind turbine collisions and displacement are the two potential primary impacts associated with offshore wind turbine operation.

A Before/After Control Site–Impact Site (BACI) design and avian/bat collision mortality monitoring will be used to determine impacts. The control and impact areas are illustrated in **Figure 2**. Three data types necessary to determine post-construction operational impacts have been identified: passage rate (number of adjusted biological tracks/kilometer [km]/hour), biological target flight altitude, and biological abundance and distribution (e.g. assessment of

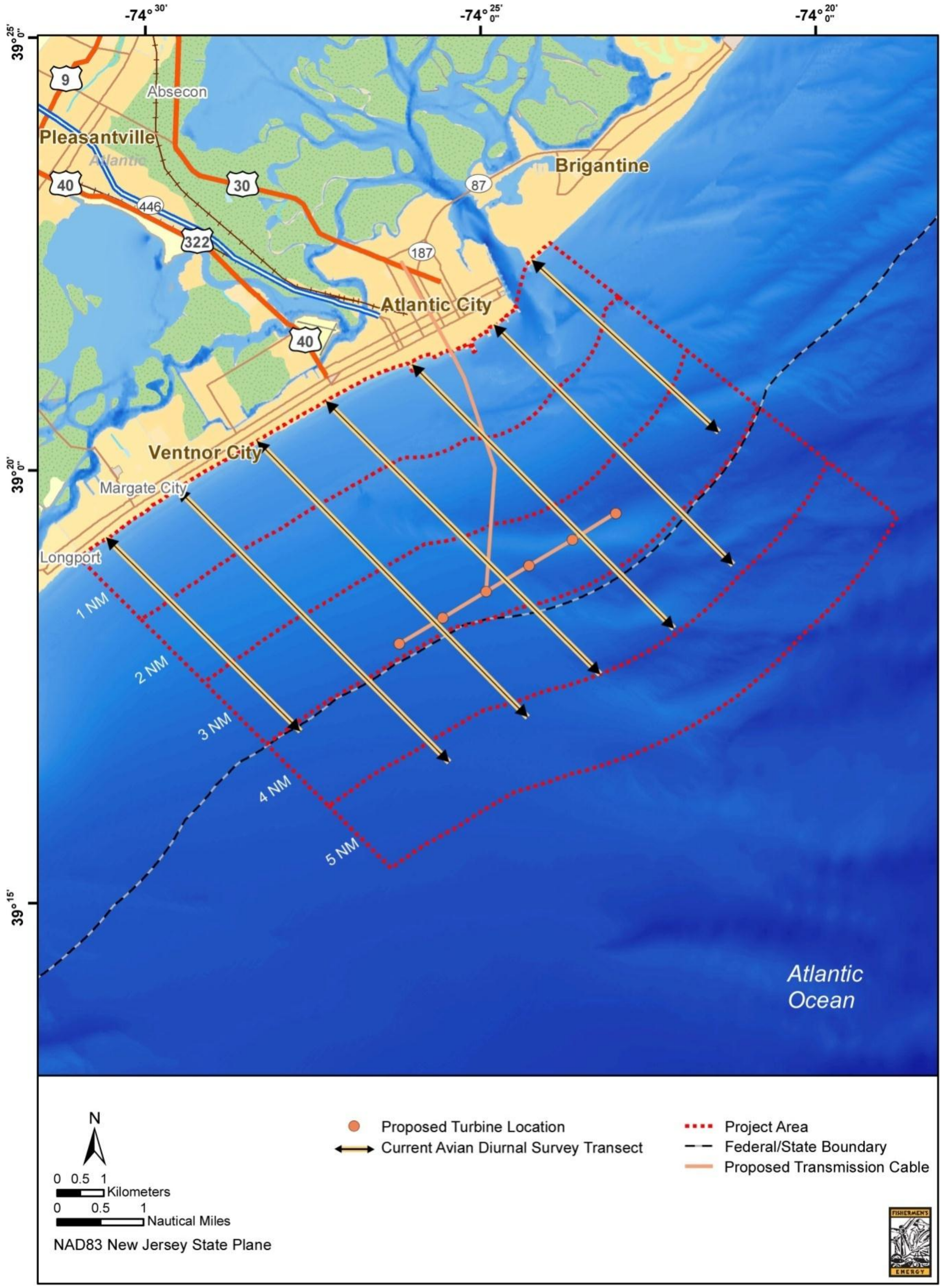

Figure 1. Proposed Project Study Area with survey track lines and a 1.5-NM buffer zone.

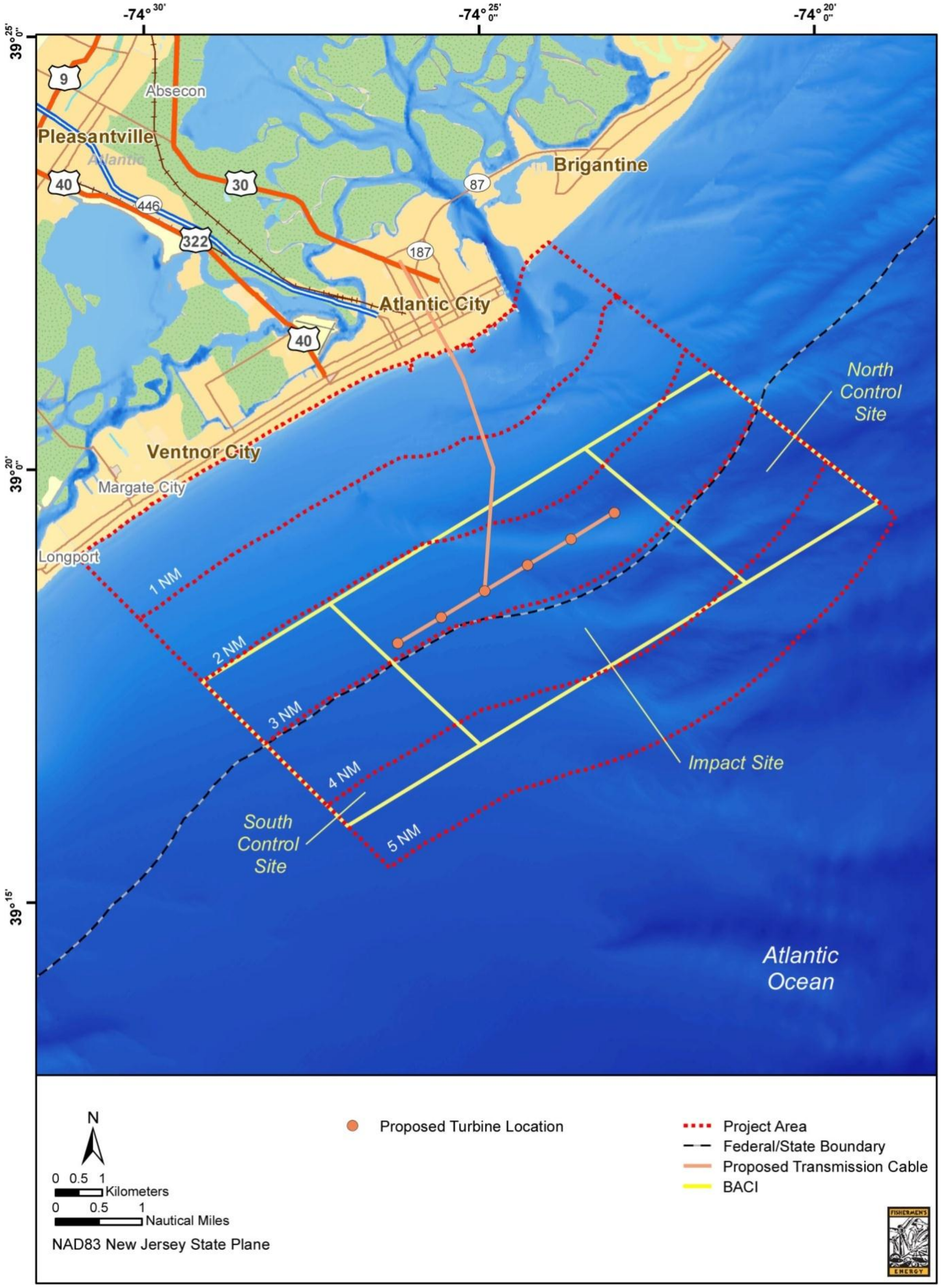

Figure 2. Project Study Area with BACI sites and a 1.5-NM buffer zone.

gradients). These data types will be used to conduct the BACI analysis as part of the post construction study. A time series analysis will be made to assess seasonal and interannual variability for the biological data and will be linked to physical characteristics within the control and impact sites. In addition, avian collision mortality data will be collected and analyzed with reference to weather variables.

The overall objectives of this study are:

1. To determine the abundance, distribution, flight behavior (i.e., height and regular pathways) of, and utilization (e.g., feeding, migration) by, birds in the Project Study Area.
2. To determine bat activity level (in calls/night) and presence/absence in the Project Study Area.
3. To determine the frequency of occurrence and presence/absence of marine mammals in the Project Study Area.
4. To determine the frequency of occurrence and presence/absence of sea turtles in the Project Study Area.
5. Conduct an onshore/offshore avian gradient abundance analysis of the Project Study Area.
6. Compare pre- and post-construction abundance and diversity from control site(s) of similar size surrounding the proposed turbines to the project site (BACI).
7. Collect and analyze avian and bat collision mortality data with reference to weather conditions.
8. Compare pre and post-construction utilization of the project area by recreational fishing, diving and commercial fishing vessels.

4.0 Survey Techniques

Proposed survey techniques to be used in the Post-Construction Monitoring Program are based on the NJDEP Technical Manual for Evaluating Wildlife Impacts of Wind Turbines Requiring Coastal Permits. These techniques have been used by GMI for the pre-construction avian and marine mammal surveys, as well as the NJDEP Ecological Baseline Study (EBS) project.

4.1 AVIAN, MARINE MAMMAL, AND SEA TURTLE SHIPBOARD SURVEYS

4.1.1 Design and Rationale

Post-construction visual shipboard strip-transect surveys for birds, marine mammals, and sea turtles will be conducted to collect the information necessary to complete this program. Shipboard bird surveys are routinely used to map and estimate density, spatial distribution, habitat use, predator-prey interactions, and potential changes due to human disturbances and climate change (Veit et al. 1996, Fauchald et al. 2002, Hyrenbach and Veit 2003, Clarke et al. 2003, Reid et al. 2004, Certain et al. 2007; Karpouzi et al. 2007, Zador et al. 2008, Santora et al. 2009). These surveys allow the observations and distribution data for a variety of bird species to be directly integrated with bathymetry and physical oceanographic variables (e.g. sea-surface temperature, fronts) to provide a comprehensive look at the spatial ecology of marine birds (Wright and Begg 1998, Certain et al. 2007, Bailey and Thompson 2009, Santora et al. 2009). Marine mammals and turtles will be recorded when encountered during transect sampling, with these sightings used to characterize presence/absence in the proposed Project Study Area.

To meet the requirements of NJDEP and the USACOE, survey transects have been designed to incorporate a 1.5-NM buffer zone surrounding the proposed turbine locations and the transmission line. It is proposed to complete two surveys during each survey day so as to include different tidal periods. Boat survey transects will be spaced 1.0-NM apart (see **Figure 1**); this approach will cover a significant part of the Project Study Area (>20%). This transect design, which was the basis of the Pre-Construction Monitoring Program, was confirmed through consultation with NJDEP and federal agencies. Survey methods will be the same as those GMI used for the Pre-Construction Study, which were developed in consultation with NJDEP and federal regulators for the NJDEP EBS. Bird density estimates (number per square kilometer [km^2]) will be calculated from standard strip-transect data by calculating the total number of birds (by species) divided by the area of the of the survey area (number of kilometers surveyed x the 300-meter [m] strip width, which is an industry standard compromise between detect ability and power). The observation dataset will be filtered to include effort conducted when the vessel was transiting at ≥ 7 knots, and for sea states ≤ Beaufort 5.

4.1.2 Methods

The general approach of the bird transect surveys is described in **Appendix A**. Based on the findings of the Pre-Construction Monitoring Program, marine-mammal populations (namely dolphins) are high during summer and this level of effort will result in sufficient data. Sea turtles occur in very small numbers in the Project Study Area, even in summer (they are generally farther offshore in summer and absent outside summer) such that even doubling survey effort would probably not result in sample sizes sufficient for statistical analysis (see NJDEP EBS).

4.1.3 Survey Schedule

Surveys will be conducted one day per week during spring (March 1 through June 15) and fall (July 15 through November 15) to document the presence of all species and to collect the site-specific data needed to meet regulatory requirements regarding the migration periods for the federally listed (endangered) roseate tern (*Sterna dougallii*), the federally listed (threatened) piping plover (*Charadrius melodus*), and the Federal candidate red knot (*Calidris canutus rufa*), collectively hereafter "L/C bird species."

4.2 AVIAN, BAT, AND MARINE MAMMAL ACOUSTIC SURVEYS

4.2.1 Design and Rationale

The identity of nocturnal migrant birds over offshore waters is largely unknown, migrant bats are strictly nocturnal, and marine mammals spend the majority of time underwater at depths where they cannot be detected visually. Knowing the species identity and relative numbers of these animals in the Project Study Area provides data for impact assessment. As a supplement to the data being collected during the transect surveys, acoustic monitoring devices will be utilized to collect diagnostic flight vocalization data of bats and birds and of marine mammal vocalization data. Bio-acoustic and ultrasonic recorders can provide data on many species simultaneously, increase the probability of identifying secretive and endangered species, and may allow regulatory agencies to develop models to assess risks to birds from wind turbines (Chris Clark, Cornell Chronicle Online, 2009). Another important aspect of this monitoring approach is that it allows for species identification during nocturnal migration events.

4.2.2 Avian and Bat Acoustic Survey Methodology

It is proposed that a SM2 Platform developed by Wildlife Acoustics, Inc. (Concord, MA) be used for acoustical monitoring of bird and bat calls. The SM2 is a two-channel ultrasonic recorder capable of continuous unattended monitoring and recording of bat echolocation calls and non-ultrasonic call notes from birds for long periods of time. This platform will be attached to the meteorological buoy stationed at the turbine siting.

Data on the migratory activity of bats will also be collected by monitoring their acoustic calls using ultrasonic microphones mounted on an aerial platform, a custom-built tethered dirigible (blimp). The use of an aerial platform is advantageous in situations where no fixed platform exists to conduct monitoring. GMI will tether the platform to a vessel and will conduct nocturnal transect surveys similar to the protocol followed during the avian survey. The study equipment is discussed in detail in **Appendix B**. The transect route planned for this effort (**Figure 3**) is 33.5 km (20 miles) long and alternates between parallel and perpendicular routes relative to the shoreline. The first transect will begin 30 minutes before sunset and continue to completion. The tethered blimp can only be operated at wind speeds below 30 miles per hour (mph), so all transects will need to be conducted during these conditions. Because most bat migratory activity occurs during low wind speed events (Reynolds, 2006, Ahlén et al., 2007, Baerwald et al., 2009) this equipment limitation should not negatively impact documentation of bat migratory activity. Additional information on acoustic monitoring of birds and bats is provided in **Appendix C**. It is recommended that a northeast-facing microphone in the fall that is parallel to the shoreline and a southwest-facing microphone in the spring be used in the program.

Passive monitoring for marine mammals through the use of Ecological Acoustic Recorders (EARs) will be conducted as a component of the program. The EARs would be attached to the meteorological buoy reducing the risk of loss and equipment and subsequent loss of data. The ear will record continuously. Additional information on acoustical monitoring of mammals is provided in **Appendix D**.

4.2.3 Survey Schedule

Bird data will be collected on the SM2 Platform during the spring and fall migration periods (March – May, August – November). Bat monitoring on the platform will occur from April 1 - May 15 and August 15 - October 15 (spring and fall migration, respectively).The focus of the boat-based bat acoustic survey will be during fall migration (particularly the August 15 – October 15 period) with a reduced sampling effort during the spring migratory season (April 15 - May 15). A weekly sampling interval will be completed during the fall migratory season (eight total transects) and a weekly sampling interval during the spring migratory season (four transects) will be conducted.

GMI proposes to monitor baseline ambient noise levels in the identified area for a 24-month period post-construction of wind turbines. A randomly selected subset of wave audio format (.wav) files will be analyzed for each hour of data collection. As the data sets become available a sub-sampling analysis routine will be developed which will yield statistically similar results to a 100% analysis effort.

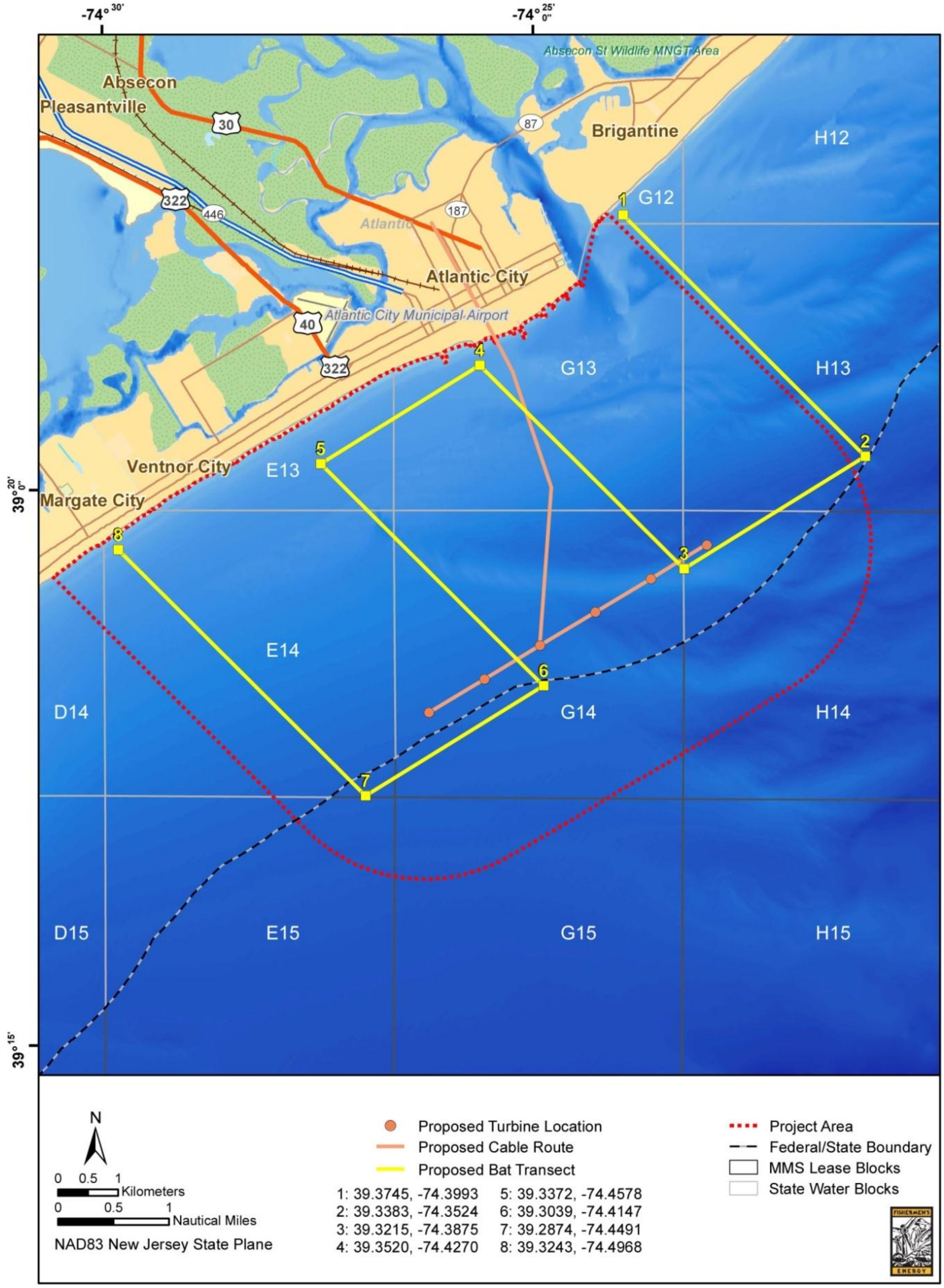

Figure 3. Proposed Bat Acoustic Survey Sampling Design.

4.3 SHORE-BASED TI-VPR & THERMAL IMAGING FROM THE TURBINE PLATFORM

4.3.1 Design and Rationale for Onshore TI-VPR and Offshore TI

Onshore thermal-imaging vertically pointed radar (TI-VPR) surveys are a critical component of radar validation. These surveys identify the number of insects detected by the vertically scanning (VerCat) radar and thereby provide the data necessary to develop a correction factor that is applied to the data to remove these non-bird (insect) targets from the database. In addition, the TI-VPR collects data on the number of foraging bats and provides additional data on bird and bat altitude distribution and flight direction.

In contrast, the offshore TI is a critical component of turbine collision monitoring.

4.3.2 Methods

The standard TI-VPR will be used onshore. For offshore, thermal imagers will be mounted directly to the bases of two turbines for monitoring avian and bat collisions during turbine operation. Additionally, Fishermen's has agreed to place one high definition video camera on the turbine to complement the TI camera.

Turbine Mounted Standard TI

The Standard TI would be composed of two thermal imagers (TI) each with a 20-30 degree field of view enabling the sampling of the turbine rotor swept zone. The data will be recorded in a computer for post survey analysis. Based on an analysis of data collected during the NJDEP ecological baseline study as well as other proposed offshore wind projects along the east coast, flight paths during migration generally tend to occur in the north to south and south to north directions in parallel to the coast line. Therefore, emphasizing remote sensing coverage on the northern and southern most turbines should be a good indicator of potential risk of collision during high migration events with the proposed array of turbines.

Fishermen's proposes that four thermal imagers will be mounted on the work decks of the northern turbine to monitor southbound migrants in the fall and southern-most turbine to monitor northbound migrants in the spring (i.e., 2 TI's per turbine). The thermal imagers would be attached to the turbine that they are monitoring, allowing optimal spacing of turbines for energy generation (**Appendix E**). A combination of thermal and high definition cameras may also be able to be used to gather more information at the species specific level. **Appendix E** provides additional information on the design and methodology proposed to conduct turbine platform based thermal imaging as a means for remotely capturing imagery related to avoidance behavior and collisions with turbines.

4.3.3 Survey Schedule

4.3.3.1 Onshore

The TI-VPR works best on clear to partly cloudy nights. Nocturnal surveys are not conducted on nights with rain, fog, virga (precipitation that does not reach the ground), or low cloud cover. Onshore nocturnal TI-VPR surveys will be conducted for 9 days in spring and 12 days in fall (21 days).

4.3.3.2 Offshore

Offshore turbine-based nocturnal TI sampling will occur during peak migration periods (60 nights during spring & 90 nights during fall) for 6 hours per night to monitor for avian and bat collisions with the wind turbines. TI-cameras will operate 24-7 and the video will be recorded at the turbine site and transmitted to shore along with other SCADA information.

4.4 ONSHORE HORIZONTAL AND VERTICAL RADAR

4.4.1 Design and Rationale

Biological target (bird and bat) wind turbine collisions and displacement are the two of the potential primary impacts associated with offshore wind turbine operation. Three data types necessary to determine post-construction operational impacts have been identified: passage rate (number of adjusted biological tracks/km/hour), biological target flight altitude, and biological abundance gradient data.

The design proposed is:

- a dual system onshore radar with an S-band radar to collect biological passage rate and abundance gradient data within 4 NM of the radar, a vertical radar set in the direction of the migration flight direction to collect nearshore biological flight altitude data, and
- boat-based diurnal visual and nocturnal thermal imaging validation surveys to collect biological flight altitude data throughout the Project Study Area.

When critically evaluated, the vertical radar set perpendicular to shore would not provide reliable altitude data because: (1) the majority of biological targets (north or south migrants) in the Project Study Area would pass perpendicular through the narrow beam and would not be detected (i.e., the vertical radar was designed to detect targets passing parallel through the beam); and (2) the vertical radar was designed to be most effective at a 1.5-NM range (target detection decreases as the beam spreads and loses intensity).

The radar study design is based on that implemented for the two-year (2008-2009) NJDEP EBS as well as consultation with NJDEP. Adoption of the NJDEP radar design would provide: (1) comparison of preconstruction radar data collected for this study, and (2) passage rate and abundance gradient data necessary to determine impacts. Supplemental diurnal visual and nocturnal thermal-imaging surveys would be conducted to provide: (1) data on flight altitude in the rotor swept zone (RSZ) throughout the Project Study Area because the onshore vertical radar, which collects biological target altitude data, would only collect data in the near-shore environment of the Project Study Area; and (2) validation of radar data. The radar-visual and thermal imaging study design was selected because it is the most scientifically sound approach based on project constraints.

Radar validation was a required component of the NJDEP EBS. Validation protocols developed by GMI for the NJDEP project would be implemented to ensure that the radar data collected is validated for the Fishermen's radar study.

4.4.2 Methods

The radar unit will be stationed on the Steel Pier in Atlantic City. The horizontal radar will be set to monitor within 4 NM of the coast. The vertical radar will be set at 1.5 NM and if possible, in the direction of nocturnal migration. Radar capabilities are discussed in detail in Appendix F.

4.4.3 Sampling Schedule

The NJDEP EBS report was reviewed to determine the time periods when onshore and offshore radars detected peak bird movements during the spring and fall migration seasons (NJDEP 2010). Based on this review, the radar would operate for 62 days in spring (March 15 to May 15) 92 days in fall (September 15 to December 15). In addition to the spring and fall surveys, three days of radar surveys would be conducted once monthly during the summer (June, July) and winter months (December, January, February).

5.0 Reporting

Semi-annual and annual reports will be produced for each of the Post-Construction years. Semi-annual reports will cover 6-month periods (May-October; November-April). The annual (final) report would cover the entire 2 year monitoring period. Data analyzed and reported for each task are discussed in this section.

5.1 AVIAN SURVEYS

Shipboard Surveys

- Survey effort
- Occurrence of resident and migratory species and/or Federal and State-listed species
- Species abundance and composition
- Avian density mapping (concentration areas)
- Shore to Project Area gradient abundance
- Avian flight behavior (number of birds in the rotor swept zone and flight direction)
- Time series analysis of seasonal and inter-annual abundance patterns

Avian/Bat Acoustic Surveys

- Survey effort
- Occurrence of resident and migratory species and/or Federal and State-listed species
- Qualitative abundance

5.2 Radar Surveys

Onshore TI-VPR

The vertically scanning radar records insects as biological targets. Data from the TI-VPR will be analyzed to determine the number of insects present in the air and will subsequently be used to develop a correction factor to eliminate insect targets from the vertical radar database. TI-VPR data metrics reported would include:

- The total number of birds, foraging bats, and insects detected per hour
- Avian altitude distribution
- Biological target (bird and foraging bat flight direction)

Horizontal (TracScan) and Vertical (VerCat) Radar

- Survey effort
- Passage rate (no. of bird tracks/km/hr)
- Altitude distribution (Quartiles: 25, 50, 75 percent)
- Flux density in the RSZ (for Collision Risk Modeling [number of bird tracks/cubic kilometer (km^3)/hr])
- Flight direction

5.3 Offshore Turbine-Based Thermal Imaging

The following elements will be summarized and reported in the semi-annual and annual reports that will be produced for each of the Post-Construction monitoring years.

- Survey effort
- Number of bird and foraging bats encountered
- Validation of radar data within the Project Study Area
- Bat and bat collision data
- Flight altitude by guild/species

5.4 MARINE MAMMAL AND SEA TURTLE SURVEYS

The semi-annual and annual reports will contain the following data collected during the marine mammals and sea turtles surveys.

- Visual survey effort
- Occurrence of resident and migratory species and/or Federal and State-listed species
- Species abundance
- Seasonal variability
- Marine acoustic analysis and reporting

5.5 BAT SURVEYS

The following data will be reported for each acoustic call:

- Date – Month/Day/Year
- Time – Hour/Minute/Second
- Height – the height of the detector at the time the call was recorded
- Bearing – the azimuth of the microphone that recorded the bat call
- Species – The species or species group identified through call analysis

For each night of observation, the following information will be collected:

- Number – Number of individual calls heard

For each migratory season, the following analysis will be conducted:

- Activity Level: the average activity level (in calls/night)

5.6 Bird Acoustic Surveys

The following data will be reported for each acoustic call:

- Date – Month/Day/Year
- Time – Hour/Minute/Second
- Species – The species or species group (guild) identified through call analysis

5.7 Final Summary Report

A summary report would be completed documenting the operational impacts and interim reports would be completed on a yearly basis during the two year post-construction monitoring period, with a final report provided to the NJDEP and the USACOE at the completion of the 2-year period.

6.0 Impact Assessment

Impact assessment will be conducted for threatened, endangered, and candidate species, for avian species (displacement, collision mortality), marine mammals and sea turtles, and bats. The methods used for impact assessment are summarized in this section.

6.1 BEFORE-AFTER CONTROL IMPACT ANALYSIS

A BACI design will be used to determine impacts. Biological target (bird and bat) wind turbine collisions and displacement are the two potential primary impacts associated with offshore wind turbine operation. Three data types necessary to determine post-construction operational impacts have been identified: passage rate (number of adjusted biological tracks/km/hour), biological target flight altitude, and biological abundance gradient data. Integrating multiyear data from shipboard and radar surveys allows an illustration of spatial and temporal variability of birds within the Project Study Area. The focus will be on a variety of species (e.g. waterfowl, gulls, gannets) to examine species-specific distribution patterns. Temporal and spatial variability will be quantified using time series models and spatial interpolation, spatial regression and/or Generalized Additive Models (GAMs) to quantify the relationships between spatial covariates (e.g. bathymetric and distance based metrics) and bird density and distribution.

6.2 LISTED SPECIES

The impact assessment will focus mostly on endangered, threatened, and rare species, as well as species that have been perceived to be at risk at wind power facilities, both onshore and offshore. The analyses would be conducted both at the level of the taxonomic group and individual species. Methods to be used for the analyses will be similar to those conducted for European offshore projects, as well as the Cape Wind project and for other projects in eastern U.S. waters. The analyses will be both qualitative (i.e., species involved) and quantitative (numbers of individuals involved).

6.3 DISPLACEMENT

Visual and radar survey data from the pre-construction phase will be compared with data from the post-construction survey and will be combined with a gradient analysis to investigate if birds are displaced from habitat within the wind turbine area.

6.4 AVIAN AND BAT COLLISION MORTALITY

Collision mortality of birds and bats will be tabulated and discussed in reference to weather data. The collision mortality data will be compared to avian and bat collision data from European and US post-construction mortality studies.

6.5 MARINE MAMMALS AND SEA TURTLES

An impact assessment will be conducted using pre- and post-construction visual observation data.

6.6 VESSEL UTILIZATION

Fishermen's will monitor recreational fishing, diving, and commercial fishing vessel activity in the project area while conducting the vessel-based transect surveys for birds and marine mammals. An analysis will be conducted to compare pre- and-post construction utilization of the project area by these vessels.

APPENDIX A

Avian and Marine Mammal Ship Survey Methods

FIELD SAMPLING METHODS

Sample Design

A trackline survey design was selected for this study instead of the "double sawtooth" design used during the New Jersey Department of Environmental Protection (NJDEP) Ecological Baseline Study (EBS). The sawtooth design was chosen for the NJDEP EBS to maximize coast-wide coverage over two years, over a significantly larger scale (Project Study Area). The Project Study Area for the Fishermen's Atlantic City Windfarm Project is much smaller in scale and scope. For the purpose of this focused near-shore study, it is important that a fixed transect grid be maintained to monitor bird, mammal, and sea turtle abundance. The objective is to gain insight into the nature of this region's dynamic tidal activity and Geo-Marine, Inc. (GMI) plans to sample transects twice on one survey period to generate high temporal and spatial replication for modeling. Data from the "sawtooth" surveys completed in the NJDEP survey can and will be compared with the current survey grid. The proposed survey grid will provide more robust data for this site-specific survey than the more generalized data collected from the previous study that covered a larger area.

A 1.5-nautical mile (NM) buffer zone was placed around the Project Area and the transmission line corridor creating the Project Study Area. Parallel survey track lines were plotted running perpendicular from the coastline to the eastern boundary of the Project Study Area (**Figure A-1**). The trackline spacing is 1.0 NM, with that interval confirmed as useful through consultation with federal and state regulatory agencies. The avian survey design will consist of strip-transect surveys conducted on one side of the trackline, with that side chosen dependent upon viewing conditions. Tracklines will be surveyed twice per survey day at approximately 10 knots (kts) when the Beaufort Sea State (BSS) is ≤ 5 and visibility is ≥ 300 meters (m). The survey area will be a 300 m x 300 m area on one side of the boat. This survey design is identical to the pre-construction design, which will allow for seamless data comparison among years.

In contrast to the accepted strip-transect protocol for avian surveys, marine mammal surveys generally include observation of the entire trackline and the areas on either side of the trackline out to the beam of the vessel and to the horizon to ensure that marine mammals can be detected before they respond to the presence of the vessel. This undertaking produces data that may be analyzed for the determination of density estimates. Due to constraints with vessel size and the number of survey scientists being employed, such data collection and analysis procedures will not be undertaken. However the survey scientists will collect all data possible and resulting analyses will produce robust frequency of occurrence and presence/absence information.

Surveys would be conducted weekly during spring (March 1 through June 15) and fall (July 15 through November 15).

Daily start points will be determined randomly among the four corners of the Project Study Area. The survey effort will be continuous from the start point to the opposite corner of the Project Study Area. Start times may be staggered to enable variation in diel survey timing. If the weather deteriorates during the course of a daily survey, then the survey will be cancelled and, if less than one iteration of the transects is completed, the survey will be resumed at the next available opportunity, assuming time and vessel availability.

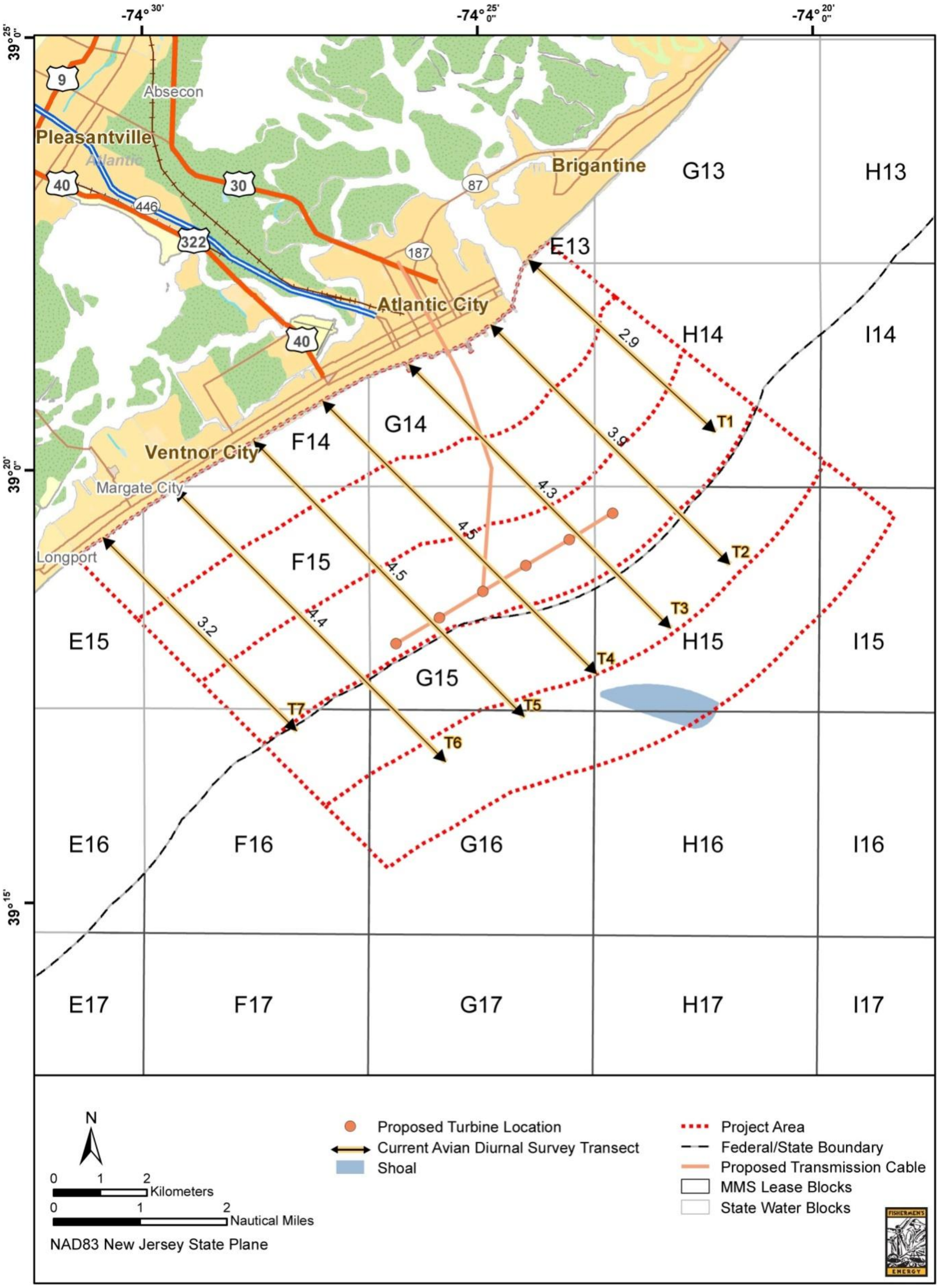

Figure A-1. Project Study Area survey transects.

Standard Operating Procedures, Data Recording, Instrument Calibration

A chartered boat equipped with an elevated observation area (based on availability), will be used to conduct the surveys. The boat will be operated by a licensed boat captain and strict safety procedures will be followed during every survey.

Two or three biologists experienced in collecting transect data at sea (i.e., experienced at identifying birds, marine mammals, and sea turtles), will be present to conduct the surveys. Observations will be conducted from the global positioning system (GPS)-equipped boat at approximately 5 m off the water (**Figure A-2**). Animals will be identified to the lowest possible taxon (preferably species) using appropriate-sized high-power binoculars. Bird observations will be made on the side of the boat with the least glare, and extend out to a perpendicular distance of 300 m and forward to a distance of 300 m. In addition, the biologists will record other sightings (e.g., congregations of foraging and roosting gannets; sea duck flocks outside of the defined survey area), incidental observations of feeding behavior, and other behaviors, even beyond the 300-m survey area as time and bird density permit. Marine mammal and sea turtle data will include observations on both sides of the trackline.

Birds

For each bird or flock, an observation number will be assigned. The geographic coordinates of the sighting location, the sighting time, species (to the lowest possible taxon [family, genus, species]), number, estimated flight altitude, behavior, and distance and bearing from the observer to the bird will be recorded. In addition, ordinal directions will be used to designate flight directions. A handheld data recorder with a customized data sheet will be used to record all observation data. Weather and sea-state conditions will be recorded.

The spatial distribution and flight behavior (i.e., collision risk with turbines) of birds may vary with weather conditions. Therefore, it is important to obtain available comprehensive information on avian use of an offshore site under various weather conditions. These data can only be obtained through monitoring in a variety of meteorological conditions. During avian studies, attempts will be made to conduct surveys in varying weather conditions. However, boat surveys will not be conducted when sea conditions (swell height and/or wave height and wave direction) pose a safety concern or affect the ability to hold the boat's course along the transect.

Marine Mammals

Survey data for marine mammals and sea turtles will be collected concurrently with avian survey effort. Biologists will focus on the quadrant ahead of the boat with the least glare/best viewing opportunities in order to follow bird-survey protocols, yet also record all marine mammal, sea turtle, and notable bird sightings (see below), to the best of their abilities, in all directions from the survey vessel. Marine mammal and sea turtle detections will thus be most accurate in the quadrant in which bird sightings are being recorded, however density modeling of these fauna would not be possible due to constraints with survey methodologies. Frequency of occurrence and general estimates of abundance of marine mammals and sea turtles, however, are acquired using the existing protocols.

QUALITY ASSURANCE/CONTROL

The data will be downloaded from the handheld data logger computer to a laptop computer and reviewed by biologists after each survey to determine if reporting errors were made. If errors are present, the observer(s) (staff biologists) will make any necessary corrections within the data file. The file will be renamed (QA-QC added to file name) and be saved on a laptop computer and external hard drive.

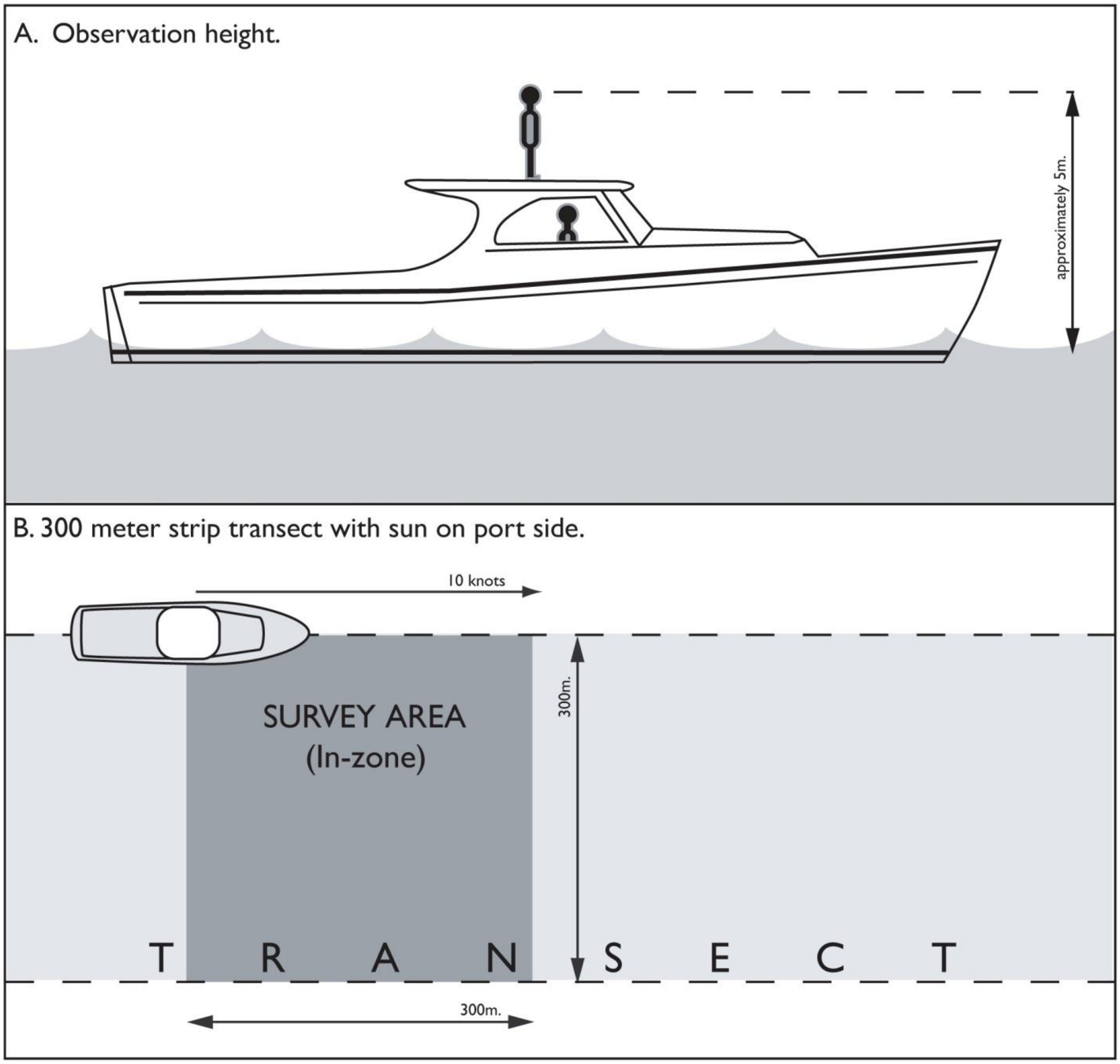

Figure A-2. Survey vessel/strip transect schematic.

APPENDIX B

Bat Acoustic Surveys

FIELD SAMPLING METHOD

Acoustic Monitoring-Aerial Platform Protocol

The use of an aerial platform is advantageous in situations where no fixed platform exists to conduct monitoring. The basic platform is a custom-built tethered dirigible ('blimp') that is attached to a line that is controlled by an electric winch (**Figure B-1**). The winch can be mounted to either a mobile platform (trailer, truck, or boat) or fixed platform (anchor station or buoy). The graduated line can be released to any height up to 500 feet. Each blimp has a belly platform that contains a programmable ultrasonic detector and associated recording equipment. The blimp can be left tethered at a single location and height for a fixed period of time, or can be moved to multiple locations and heights to increase spatial and vertical sampling.

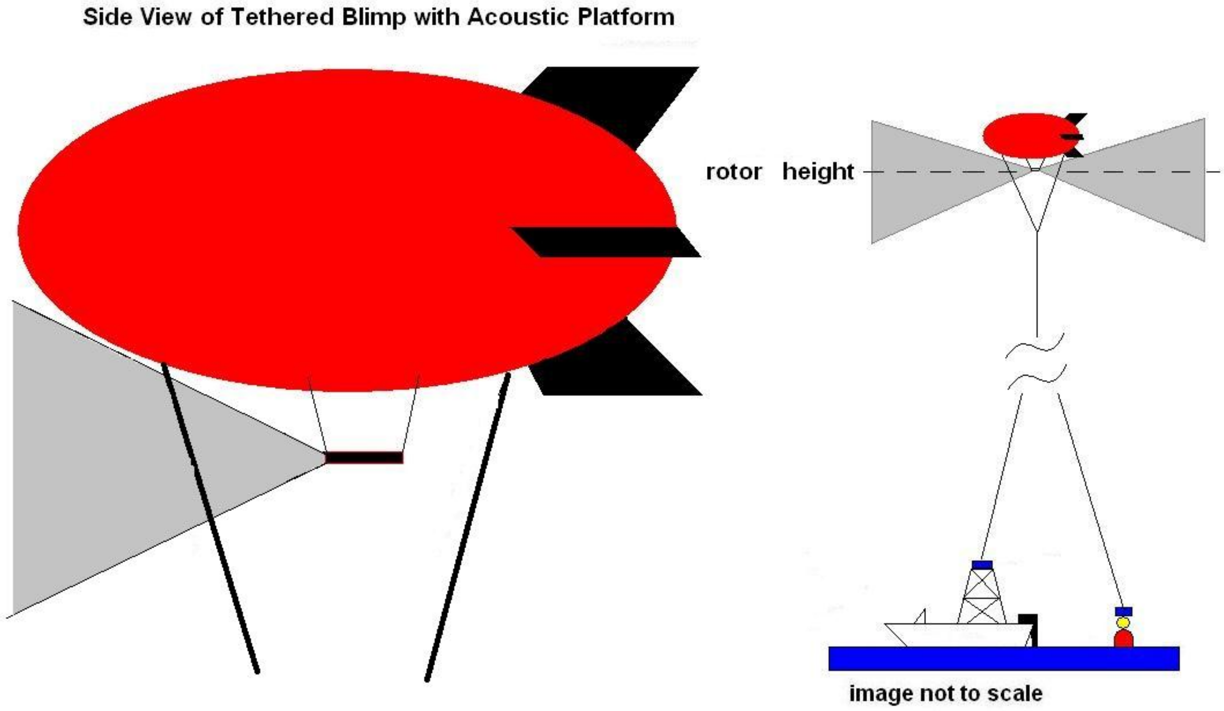

Figure B-1. Proposed acoustic platform using tethered blimp.

The acoustic monitor (Anabat II ultrasonic detectors: Titley Electronics) is set up on a detector platform as shown above. The microphones are capable of detecting the echolocation calls of approaching bats up to 20 meters (m) away with a potential sampling volume of 254 cubic meters (m^3) (Larson & Hayes, 2000). The blimp will hold the ultrasonic microphones at altitude using a weatherproof detector platform. Each microphone will be connected to a Anabat SD-1 data processing and storage unit with at least 516 megabytes (MB) of CF storage capacity (this will allow us to store approximately 10,000 individual bat passes). The detectors will be connected to a 12-volt power supply contained within the detector platform.

Transect Protocol

Geo-Marine, Inc. (GMI)/North East Ecological Services (NEES) recommends a transect protocol that is analogous to the surveys conducted as part of the avian risk assessment. The proposed transect route (**Figure B-2**) is 33.5 kilometers (20 miles) long and alternates between parallel and perpendicular routes relative to the shoreline. The transect will begin 30 minutes before sunset and continue to completion. The tethered dirigible can only be operated at wind speeds below 30 miles per hour (mph), so all transects will need to be conducted during these conditions. Because most bat migratory activity occurs during low wind speed events (Reynolds, 2006, Ahlén et al., 2007, Baerwald et al., 2009) this should not negatively impact the documentation of bat migratory activity.

GMI will focus on fall migration sampling (particularly the August 15 – October 15 period) with a reduced sampling effort during the spring migratory season (April 15 – May 15). NEES recommends weekly sampling interval during the fall migratory season (eight total transects) and a weekly sampling interval during the spring migratory season (four transects). GMI will use a northeast-facing microphone in the fall that is parallel to the shoreline and a southwest-facing microphone in the spring.

Each acoustic call heard will be recorded by the monitoring equipment and stored for subsequent analysis. The following data will be collected and recorded for each acoustic call:

- Date – Month/Day/Year
- Time – Hour/Minute/Second
- Height – the height of the detector at the time the call was recorded
- Bearing – the azimuth of the microphone that recorded the bat call
- Species – The species or species group identified through call analysis

For each night of observation, the following information will be collected:

- Number – Number of individual calls heard

For each migratory season, the following analysis will be conducted:

- Activity Level: the average activity level (in calls/night)

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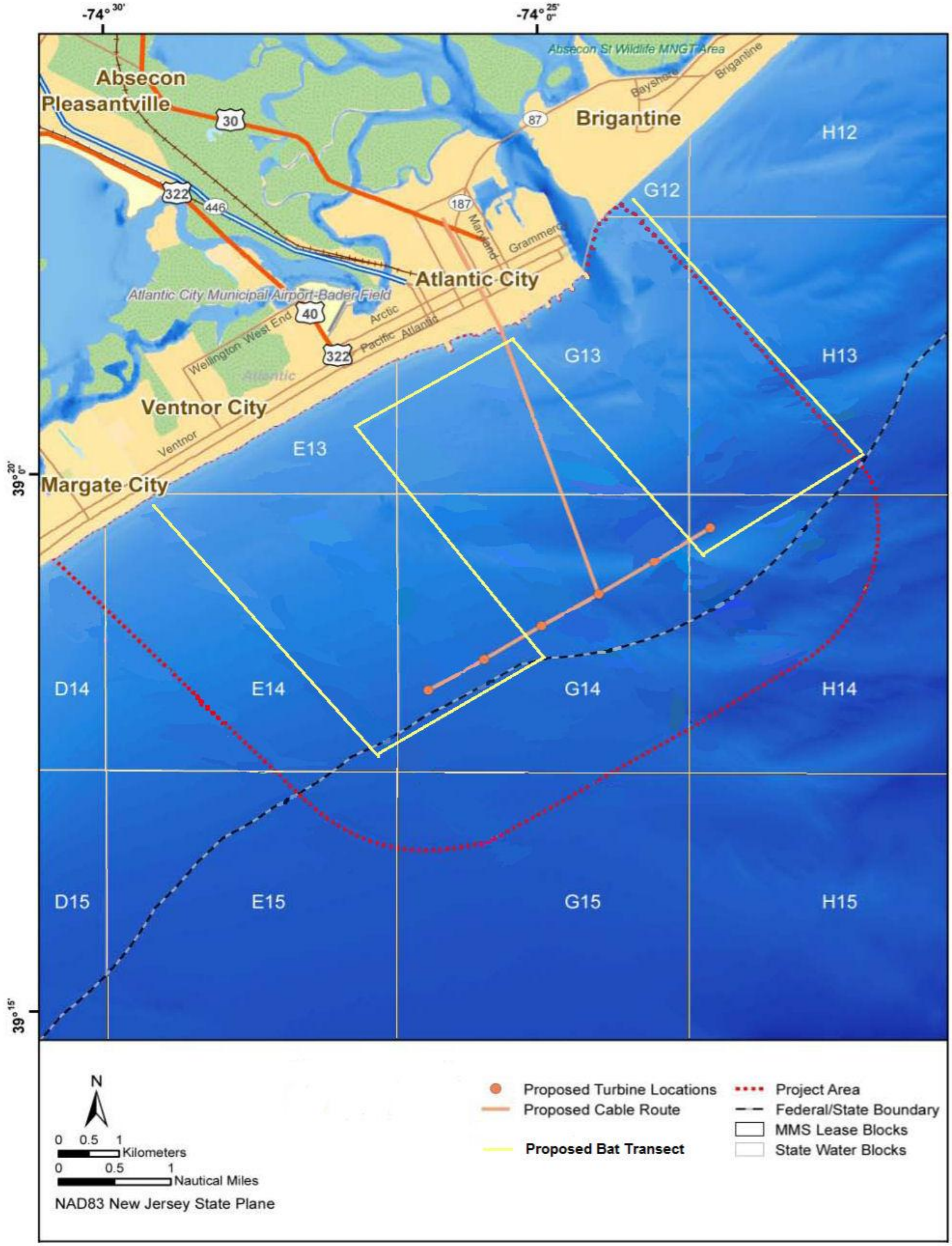


Figure B-2. Proposed acoustic transect for monitoring bat migratory activity.

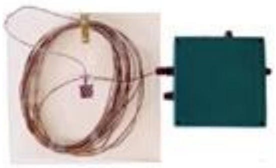
APPENDIX C

Bird and Bat Acoustic Monitoring/Equipment Specifications

SAMPLING DESIGN

For acoustical monitoring of bird and bat calls GMI will use the SM2 Platform developed by Wildlife Acoustics, Inc. (Concord, MA). This device will be mounted to a pole attached to the meteorological buoy. Bird data will be collected during the spring and fall migration periods (March – May, August – November) Bat monitoring will occur April 1 - May 15 and August 15 - October 15 (spring and fall migration, respectively).The SM2 package is a weatherproof, low-power, two-channel ultrasonic recorder capable of continuous unattended monitoring and recording of bat echolocation calls and non-ultrasonic call notes from birds for long periods of time. Each channel has independent triggers, filters and gain settings and the two channels allow recordings from two different microphones. One microphone can be used to monitor bat calls while another simultaneously records birds and other non-ultrasonic sounds. Post-processing "Wac2Wav" software from Wildlife Acoustics will be used to convert recordings made by the SM2 to either standard .WAV files or legacy zero-crossing files while removing false triggers caused by background noise.

Based on the powerful SM2 Recorder Platform, the SM2 Night Flight Call Package includes a special SMX-NFC weatherproof microphone designed especially for recording distant night flight calls in the sky while attenuating sounds at and below the horizon such as insects. The SMX-NFC has a microphone capsule mounted near the surface of a flat horizontal plate creating a pressure zone for sounds originating from above the plate. The design delivers flat frequency response up to 11 kilohertz (kHz) and 3- to 6-decibel (dB) signal gain with a beam angle of 125 degrees.



SONG METER SPECIFICATIONS

Physical Specifications

- Dimensions: 8.0" X 8.0" X 2.5"
- Weight: 2.0 pounds without batteries
- Enclosure: NEMA Type 1,4,4X and 6 (weatherproof, vented)
- Operating Temp.: -4ºF to +185ºF -20ºC to +85ºC

Audio Specifications

- ChannelsChannels:2
- Interface: 3-pin waterproof connector (ground, signal, 3.3 V supply)
- Bias power: 2.5 V 2.2 K ohm, jumper enabled per channel
- High-pass filter: 2-pole butterworth, jumper selectable per channel at 2, 180 or 1,000 Hz
- Pre-amplifier: 2-stage, jumper selectable per channel, at +0, +12, +24, +36, +48, or +60dB gain. For sample rates:
    - 48 kHz, third-stage digitally-configurable +0-+12 dB in 1.5-dB steps
- Noise: -115-dBV equivalent input noise
- ADC: 1 V rms full-scale 16-bit, 90dB SNR

- Sample rates: 4, 8, 16, 22.05, 24, 32, 44.01 and 48 kHz standard; 192 kHz with SM2BAT daughter card
- Digital format: 16-bit PCB (.wav) or proprietary lossless and lossy compression formats (.wac)

Headphones: 3.5mm stereo jack
Filtering and triggering: Configurable digital high-pass and low-pass filters at sample rate divided by 3, 4, 6, 8, 12, 16, 24, 32, 48 and 96. Adaptable trigger with configurable threshold above background 1-88 dB, absolute trigger with configurable threshold -1-88 dB full scale, inactivity time for trigger off 0.1 - 9.9 seconds.

Sensors

- Channels: 2
- ADC: 10-bit at 3.3-V reference (3.2-millivolt resolution)
- Parameters available for precise calibration
- Internal temperature sensor accurate to within ±2ºC at 0ºC.
- External sensor port with 3-pin waterproof connector (ground, signal, 3.3-V supply)

Storage

- 4 SD/SDHC/SDIO flash card slots (Class 4 or greater)
- 128-GB total capacity with 4x32-GB cards available today, more as higher capacity cards become available
- Compression increases effective capacity by 60-70% typically

Power

- 4-10 VDC main power (internal 4 D-size batteries or external weatherproof connector)
- 6-20 VDC through external power adapter for 6 or 12 V solar power systems
- <1 mA when idle between scheduled recordings
- *The following estimates can vary 10mA depending on flash cards used:*
  - 55-65 mA when recording uncompressed up to 48 kHz (except 32 kHz), compressed up to 16 kHz mono, and band triggered up to 8 kHz mono.
  - 70-75 mA when recording compressed up to 48 kHz (except 32 kHz), and band triggered up to 24 kHz mono.
  - 80-90 mA when recording 32 kHz and up to 48 kHz compressed, and band triggered up to 44.1 kHz mono.
  - 90-100 mA when recording band triggered up to 48 kHz mono.
  - 110 mA when recording band triggered up to 48 kHz stereo.
  - Separate power for time-of-day clock uses 2 AA-size batteries, <0.1 milliamps (2-3 year service life)

SMX-II Microphones

- Enclosure: NEMA 4X weatherproof
- Sensitivity: -36±4 dB (0 dB=1 V/pa @1 kHz)
- Frequency response: flat 20 Hz - 20,000 Hz
- Signal-to-Noise Ratio: >62 dB
- Directionality: Omnidirectional

APPENDIX D

Marine Mammal Passive Acoustic Surveys

FIELD SAMPLING METHODS

INTRODUCTION

The ocean is a naturally noisy environment (Scheifele & Darre 2005), with noise being defined as "unwanted" sound that clutters and masks signals of interest (Au 1993). The National Research Council (NRC) on Ocean Noise recently reported that overall anthropogenic noise is increasing on average throughout the world's oceans at a rate of 3 decibels (dB) per decade. Sound, unlike light and other stimuli, is transmitted extremely efficiently through water: underwater noise created by ships and other human activities can be detected many kilometers from the original source (Richardson et al. 1995). Marine mammals use the efficiency of underwater sound propagation as a primary mode of communication with one another in turbid waters, at night and at depths in which light does not penetrate (Richardson et al. 1995). Any signal in water or air is detectable only if the received level of that sound exceeds the animals' detection thresholds with respect to the noise level of the environment in which it is broadcast. If the signal reaching an animal is weaker than the background noise, the probability of detection will be low. Therefore, elevated background noise levels caused by either natural environmental or anthropogenic sources might prevent detection of sounds (e.g., from peers, prey) important to marine mammals (Richardson et al. 1995).

Characterizing Underwater Ambient Noise via Passive Acoustic Monitoring

GMI proposes to monitor baseline ambient noise levels in the identified area for a 24-month period post-construction of wind turbines within 2.5 to 3.5 miles of the New Jersey coastline. Passive acoustic monitoring ("static acoustics") will be conducted with two devices: one set to a sample rate of 2 kilohertz (kHz; low frequency) and one set at about 31.25 kHz (high frequency) that will be deployed roughly at the center of the proposed turbine field from the planned turbine construction location to provide a consistent data stream of ambient noise levels related to periods of construction and noise levels outside of construction activity. This passive acoustic monitoring will facilitate an overview examination of ambient noise levels within 4.0 miles of the turbine and allow for analysis of potential marine mammals that might be documented acoustically within this zone. The passive acoustic monitoring devices will be deployed for three-month deployments during the twenty four month post-construction monitoring phase.

Passive Acoustic Monitoring – "Static Acoustic" Monitoring

Sample Design

Use of both low-frequency and high-frequency recording devices is justified based on previous environmental monitoring conducted in the identified Project Study Area. That is, Toth et al. (in press) identified a population of bottlenose dolphins (*Tursiops truncatus*) that are resident to the coastline of New Jersey. Bottlenose dolphins were also documented seasonally during the environmental baseline study that Geo-Marine recently completed for the New Jersey Department of Environmental Protection (http://www.nj.gov/dep/dsr/ocean-wind/). Dolphins produce vocalizations (e.g., whistles and click trains) routinely between 2 and 22 kHz. While most baleen whales would not likely be within 2 miles of the coastline, North Atlantic right whales (*Eubalaena glacialis*) have been documented in the near-shore regions of the Gulf of Maine and along the coastlines of Georgia and Florida (Good 2008; Niemeyer et al. 2008; Zani et al. 2008). Additionally, this critically endangered baleen whale species was documented acoustically and visually during three seasons in shallow water areas during the EIS that Geo-

Marine recently completed for the NJDEP (http://www.nj.gov/dep/dsr/ocean-wind/). North Atlantic right whales produce calls of frequencies less than 500 hertz (Hz), which warrants use of a recording device set to capture sounds in the low frequency sample rate.

GMI will use two (2) Ecological Acoustic Recorders (EARs) that can be attached to mooring lines for swift and easy deployment and recovery operations. The EAR is a digital, low-power acoustic recording system designed for long-term monitoring of natural and anthropogenic sounds between 20 Hz and 40 kHz in aquatic habitats. There are three types of EAR: a shallow-water (0 - 36 meters [m]) version that is diver-deployed (**Figure 1**), a deep-water version that can be deployed to a depth of 500 m and an extra-deep version deployable to 1000 m. GMI proposes application of two shallow-water units. The EAR system is based on a Persistor CF2 microprocessor and a 16-bit analog-to-digital converter that records the ambient sound field on a duty cycle and stores the recordings on an onboard 160 gigabyte (GB) disk. Recordings are initiated in two ways: on a software-regulated schedule and on an analog start trigger set to a specific received acoustic energy threshold (used for detecting transient sounds such as vessel engine noise). Detailed specifications are available upon request.

Figure 1. Shallow-water EAR attached to lead anchor. (From Lammers 2010 [spec sheet]).

The EAR devices are lightweight and easy to deploy and recover. Because refurbishment entails only replacement of an SD card and installation of fresh batteries, recovery and refurbishment procedures can be conducted during the same vessel trip, which saves costs relative to diver time and vessel costs. Data can be extracted from the recovered SD cards in the office post-recover operations.

Data will be collected on a set duty cycle per sample rate to maximize the amount of data collected during each three-month period. All detected marine mammal vocalizations within the 20-Hz to 16-kHz frequency band (from both EARs combined data sets) will be identified to at least family and, in most cases, to species. XBAT signal processing and Raven (software designed by Cornell) will be used for analysis of all calls recorded. The presence of marine mammal vocalizations within the Project Study Area will be investigated to determine if and when these animals use the area. Vocalizations identified and documented will be quantified and compared to give a better understanding of the total number of vocalizations detected in the time period over the Project Study Area for which data were recorded. Ambient noise will be examined for the Project Study Area in plots modeled for diurnal and seasonal characterizations.

QUALITY ASSURANCE/CONTROL

For QA/QC, each EAR unit will be examined to assure proper working condition prior to each deployment, and post-deployment to validate that data were accurately recorded. Recorded data will be evaluated for content and continuity by randomly checking 5-min samples throughout the dataset. Marine mammal signals identified by the automated detectors will be verified by researchers visually; researchers trained and experienced in bioacoustics analysis will visually inspect spectrograms of the sound data.

APPENDIX E

Turbine-Based Thermal Imaging

Background

Thermal imaging (TI) cameras will be used to monitor the rotor swept zone in an effort to detect collision events involving birds and bats. Unlike infrared cameras that require a source of infrared illumination to detect targets, TI cameras are passive and detect heat signatures from birds, bats, and insects and not influence flight behavior (e.g., light attraction). A high-resolution, passive TI-system can detect even small nocturnal migrants up to a distance of at least 3 km (Liecht et al. 1995), and Gauthreaux and Livingston (2006) demonstrated that high-end thermal imaging cameras can be used to monitor the passage of small birds at a distance of 1 km (3281 ft). TI cameras also perform better than conventional video cameras in light rain and thin fog.

Equipment

GMI has evaluated several different TI-cameras for monitoring bird and bat movements at night in a marine environment and feels a Hurley or FLIR are appropriate for this application (**Figure E-1**).

Figure E-1. A Hurley TI-camera hardened for weather and the marine environment with a wiper to keep the lens clean.

Main Specifications

Imaging Performance	
Detector type:	Focal Plane Array (FPA), uncooled microbolometer 320 x 240 pixels
Spectral range:	7.5 to 13µm
Field of view:	20° (H) x 15° (V) with 35 mm lens
Spatial resolution (IFOV):	1.1 mrad
Thermal sensitivity:	85 mK at 25°C
Image frequency:	7.5Hz (NTSC) or 8.3 Hz (PAL)
Focus:	fixed
Electronic zoom:	2x
Image processing:	Automatic Gain Control (AGC), Digital Detail Enhancement (DDE)
Image Presentation	
Video output:	NTSC or PAL composite video
Connector types:	BNC (1) provides video output
Power	
Requirements:	14-32 V DC or 24 V AC +/- 10%
Consumption:	6 W Nominal, 24 W startup peak, at 24V DC, at 23°
Environmental	
Operating temperature range:	-32°C to +55°C
Storage temperature range:	-50°C to +85°C
Humidity:	Rain
Sand/dust:	Mil-Std-810E
Encapsulation:	IP66
Shock:	Mil-Std-810E
Vibration:	Mil-Std-810E
Physical Characteristics	
Camera Weight:	2.7 kg
Camera Size (L x W x H):	279mm x 132mm x 142 mm
Interfaces	
Factory configured:	RS-232

The TI-camera will be protected from the weather and capable of streaming video and transmitting it to a receiving station on shore. The camera will have a field of view with sufficient resolution to resolve small birds and bats at a distance beyond the peak height of the rotor swept zone and enable observations of bird and bat behavior in the vicinity of the rotor swept zone of the turbine at night and during the day, and to the extent possible, during periods of inclement weather. The cameras will be mounted on the work deck of two of the turbines (**Figure E-2**).

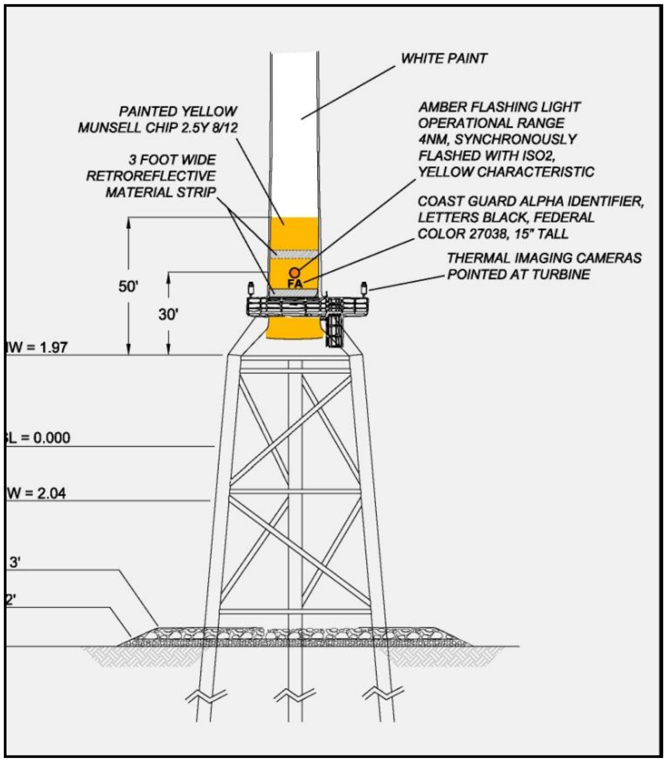


Figure E-2. Location of thermal imaging camera(s) on work deck of each turbine.

The current system that has been tested in Europe (Thermal Animal Detection System [TADS]) has a limited field of view and only has been able to monitor small portions of the rotor swept zone. No single standard camera can monitor the entire rotor swept zone of a turbine if the camera is mounted on the same turbine (Desholm 2003, Desholm et al. 2006). Because of this limitation Fishermen's will investigate the effectiveness of two cameras on the turbine being monitored so that the field of view of the TI's cover the rotor swept zone (**Figure E-3)**.

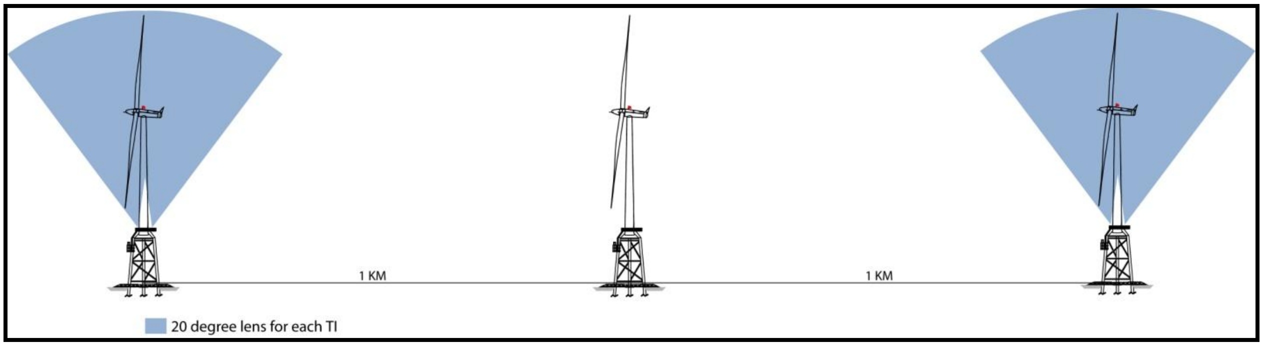


Figure E-3. A diagram showing how dual TI-cameras will monitor the rotor swept zone of the host turbines.

Survey effort

Based on an analysis of data collected during the NJDEP ecological baseline study as well as other proposed offshore wind projects along the east coast; flight paths during migration generally tend to occur in north to south and south to north directions parallel to the coast line. Therefore, emphasizing remote sensing coverage on the northern and southern most turbines should accurately measure the potential collision risk with the proposed array during migration events. TI-cameras will operate 24-7 and the video will be recorded at the turbine site and transmitted to shore along with other SCADA information.

Data Analysis

TI monitoring will occur during seasonal periods of peak migration (60 nights during spring & 90 nights during fall) for 6 hours per night. Examination of every second of video record would be time and cost prohibitive. Consequently, the amount of video record analyzed will depend on the frequency of bird/bat detections within an hour (the interval between organism/turbine encounters). Initially the video record for an evening will be previewed to determine the number of encounters per hour. If encounters are extremely rare then sampling time will be increased, and if encounters are frequent sampling time will be reduced (5 minutes per 15 minutes of record).

Currently there is no reliable method of automatically processing TI-camera video to detect small birds and bats passing through the rotor swept zone when blades are moving. Information on the behavior of each target (linear flight, avoidance, or collision), possible general identity (e.g., small or large bird, bat), viewing conditions, and time of the event will be recorded in an Excel worksheet. GMI takes steps to streamline the analysis of the data. For example, GMI sends data through a video peak store (VPS) to analyze tracks. The VPS works by storing a new incoming pixel if it is brighter than the corresponding pixel already stored in frame memory. This results in a visible track being displayed on the screen for a bright target moving against a dark background (i.e., a warm biological target against a cold sky). This enables the visual extraction of track characteristics which are used in determining target identifications. GMI is currently investigating software applications that will automatically analyze TI data (e.g., flagging target passage events, target tracking) and assist in determining target identifications. Whenever possible, acoustical and TI-camera data for the same time periods will be compared for reports.

In addition to the TI monitoring, a high definition video camera will be operated in conjunction with a TI to monitor the turbine for bird collisions during the day. The video data will be scanned for targets in an attempt to identify birds to the species level, when possible. The TI data will then be examined to determine the signature (shape and configuration) of the target. By comparing TI and visible video simultaneously, GMI will generate a valuable data set that can be used to make more confident decision regarding the identity of targets detected with the TI at night.

Remote sensing is an emerging technology and the methods for capturing and analyzing data are continuously improving. Fishermen's proposes to implement an adaptive approach to monitoring in order to determine the most efficient means of collecting and analyzing information relating to biological risk assessments at offshore wind development sites.

References

Desholm. M. 2003. Thermal animal detection system (TADS). National Environmental Research Institute Technical Report, No. 440, Ministry of the Environment . Denmark.

Desholm M., A. D.Fox, P. D. L. Beasley, J Kahlert. 2006. Remote techniques for counting and estimating the number of bird–wind turbine collisions at sea: a review. *Ibis* 148: 76-89.

Gauthreaux, S. A., Jr., and J. W. Livingston. 2006. Monitoring bird migration with a fixed-beam radar and a thermal imaging camera. Journal of Field Ornithology 77:319-328.

Liechti, F., B.Bruderer, and H. Paproth. 1995.Quantification of nocturnal bird migration by moonwatching: comparison with radar and infrared observations. Journal of Field Ornithology 66: 457–468.

APPENDIX F

Avian Radar

Mobile Avian Radar System (MARS®)

This section provides a description of the MARS® including standard operations and capabilities, and discusses the real-time data processing performed by the MARS®.

For this study, the MARS® was equipped with two radar systems (**Figure 1**):

- A TracScan (Horizontally Scanning Radar [HSR]) which determines the number, range, flight direction, speed, and heading of biological targets.
- A VerCat (Vertically Scanning Radar [VSR]) that determines the altitude and range of biological targets.

Both the TracScan (HSR) and VerCat (VSR) use commercially available marine-band radars that transmit radio signals and receive reflected signals from targets (echoes). These radars transmit for a very short duration (pulse length) and then receive signals from echoes until the next pulse is transmitted. The number of times per second that radar transmits a pulse and receives is the pulse repetition frequency (PRF). Radar manufacturers fix combinations of pulse length and PRF in the radar hardware. Commercially available marine-band radars effectively see in two dimensions, using the time between pulse and detection to determine the distance to the target, and the orientation of the radar antenna to determine bearing of the target.

Figure 1. GMI MARS® showing both VerCat (vertically scanning) radar (left) and TracScan (horizontally scanning) radar (right), the computer housing unit, and the generator.

TracScan (Horizontally Scanning Radar)

The TracScan (HSR) is used to track bird movements in the horizontal plane. Speed and direction of movement and echo intensity is measured for each track automatically. The

TracScan (HSR) radar scans in the horizontal plane at 24 revolutions per minute (rpm), completing one scan (a full 360-degree [°] rotation) every 2.5 seconds (s) (**Figure 2**). Given a PRF of 1,500 times a second, the TracScan (HSR) can transmit 10.41 pulses for every degree of radar rotation.

VerCat (Vertically Scanning Radar)

The MARS® VerCat (VSR) scans a 20° wedge in a vertical sweep from the horizon, through zenith to the opposite horizon (**Figure 3**). No signal is transmitted while the antenna is pointing below horizontal; however, given the 0.95° vertical resolution of the antenna, when the radar transmits a pulse horizontally, almost one half of the energy is projected below the horizon towards the ground or water. The radar scans at 24 rpm, completing one scan (a full 360° rotation) every 2.5 s. Given a PRF of 3,000 pulses per second, it can transmit 20.83 pulses for every degree of radar rotation. The radar signal is transmitted through an 8-ft (2.4-m) long array (T-bar) antenna. The antenna focuses the signals into a fan-shaped beam, which is 0.95° in the vertical scanning plane and extends 10° to either side of the scanning plane (20° total). Radar antennas are designed to operate scanning horizontally, not vertically. When the antenna is pointing at the sky, some radio energy leaks out the backside of the standard antenna and bounces off the ground. The MARS® VerCat (VSR) antenna has been fitted with a custom-designed shield to minimize the impact of this ground-bounce clutter.

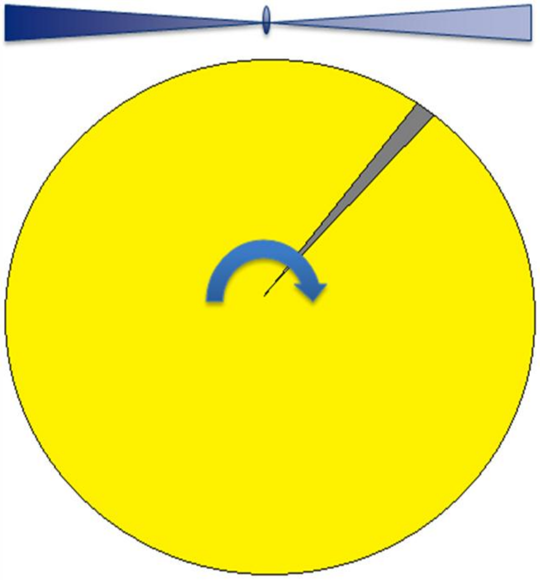


Figure 2. TracScan (HSR) coverage pattern.

The VerCat (VSR) scan pattern results in a "radar curtain," that samples biological targets as they fly through the 20° by 180° scanning volume within 1.5 NM (2.8 km) of the radar. For this study, the VerCat (VSR) stopped transmitting when it reached the horizontal. The radar determines biological target altitude and downrange distance from the MARS® site. The VerCat (VSR) vertical beam width of 0.95° provides fine angular resolution from which estimates of biological target altitude can be determined. Biological targets flying within the beam parallel to the VSR scan can be tracked and accurate ground speeds measured; however, biological targets crossing perpendicular to the sweep of the beam appear stationary and biological targets crossing the sweep at angles between parallel and perpendicular have ground speeds reduced from true ground speeds. Consequently, the VerCat (VSR) is used only to measure the altitude of biological targets. Wind speeds in excess of 30 to 35 knots (kts) along the VerCat (VSR) scan axis will trip the VerCat's (VSR) motor safety breaker and shut down the radar. By shutting down operation, the radar protects itself from damage.

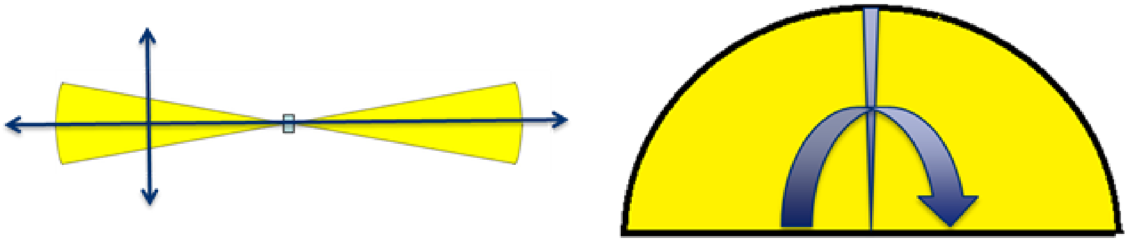


Figure 3. VerCat (VSR) coverage pattern.

Thermal Imaging-Vertically Pointed (TI-VPR) Radar

The TI–VPR system for this study was stationed on the MARS® and consists of two components (**Figure 4**):

- TI, pointed up vertically to obtain target identification, behavior, and X/Y dimensional information.
- VPR, pointed up vertically to obtain altitude (Z dimension) of targets within the TI field of view.

The TI selected for this study is a fixed focus, un-cooled TI camera (FLIR Standard Resolution [SR]-35, FLIR Systems, Inc., Goleta, California) with a 1.4-inch (in.; 35-millmeter [mm]) lens and a 20° field of view. This camera is well-suited for short range surveillance use (i.e. monitoring activity within the potential turbine RSZ) with a minimum focus distance of only 3 ft (1 m). It has a standard resolution focal plane array (FPA) of 320 x 240 pixels with a pixel pitch of .0015 in. (38 microns [µm]) and a spectral range of 0.0003 to 0.0006 in. (7.5 to 13 µm). The camera is able to operate in temperatures ranging from -25 degrees Fahrenheit (°F) to 130°F (-32 degrees Celsius [°C] to 54°C).

The VPR (FURUNO FR-1525 Mark-3, FURUNO Electric Co, LTD., Nishinomiya, Japan) was coupled to a standard gain horn antenna (WR-90, Pasternack Enterprises, Inc., Irvine, California) with a beam width of 15°. A right angle waveguide elbow was used to point the horn antenna up parallel with the TI. The transmitter frequency was 9,410 ±30 megahertz (MHz; X-band, 1-in. [3 centimeter (cm)] wavelength) with peak power output of 25 kW and a minimum range detection of 115 ft (35 m).

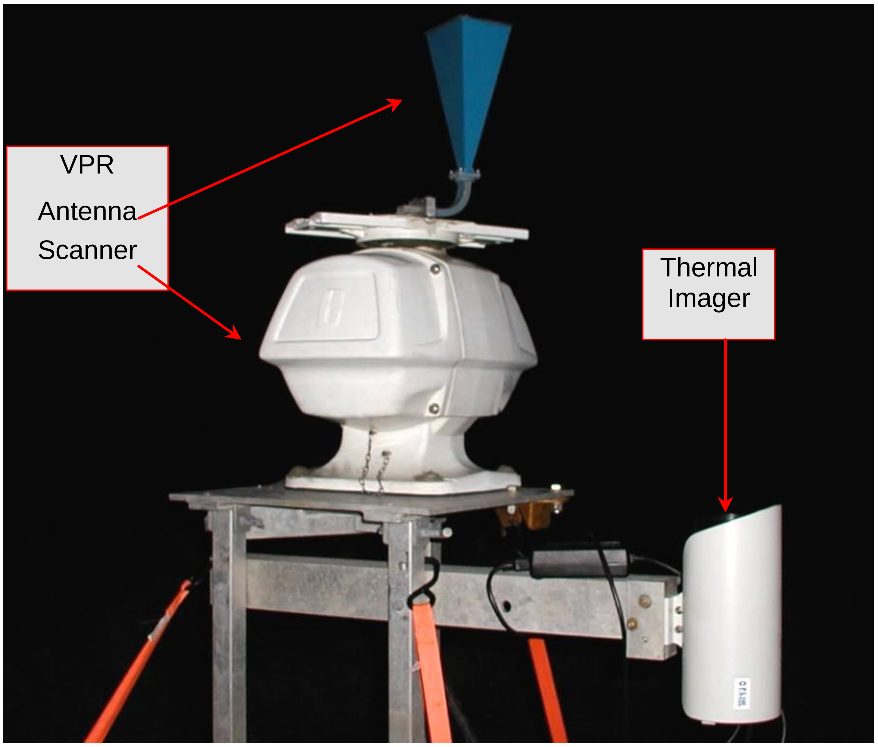


Figure 4. MARS® TI-VPR system.

APPENDIX C

AGENCY CORRESPONDENCE

Department of Energy
Golden Field Office
15013 Denver West Parkway
Golden, Colorado 80401

December 15, 2014

Frank J. Cianfrani, Chief
Regulatory Branch, Philadelphia District
U.S. Army Corps of Engineers
Wanamaker Building
100 Penn Square East
Philadelphia, Pennsylvania 19107-3390

Subject: DOE Cooperating Agency Request under the National Environmental Policy Act for Fishermen's Atlantic City Windfarm, LLC (Permit number CENAP-OP-R-2008-0777-39)

Dear Mr. Cianfrani:

The U.S. Department of Energy (DOE) is developing an Environmental Assessment (EA) to analyze the potential impacts of providing federal funding to Fishermen's Atlantic City Windfarm, LLC, (Fishermen's) an offshore wind-energy development company, to support the development of an offshore wind renewable energy facility within New Jersey State Waters located approximately 2.8 miles off the coast from Atlantic City, New Jersey (Proposed Project).

DOE selected Fishermen's to receive federal funding under the *U.S. Offshore Wind: Advanced Technology Demonstration Projects Funding Opportunity Announcement*, DE-FOA-0000410 (FOA), contingent on the outcome of the National Environmental Policy Act (NEPA) review and other considerations. This FOA was issued to provide support for regionally-diverse Advanced Technology Demonstration Projects through collaborative partnerships. The main intent of the Advanced Technology Demonstration Projects is to expedite the development and deployment of innovative offshore wind energy systems in U.S. waters that have a potential to lower the cost of energy from offshore wind. These projects are part of a portfolio of market analysis, technology development, and demonstration projects funded by DOE pursuant to a national strategy developed in coordination with the U.S. Department of the Interior.

By providing federal funding, technical assistance and government coordination to accelerate deployment of these demonstration projects, DOE can help eliminate uncertainties, mitigate risks, and support the private sector in creating a robust U.S. Offshore Wind Energy Industry.

DOE understands that your agency has issued Individual Permit number CENAP-OP-R-2008-0777-39 for the Proposed Project under Section 404 of the *Clean Water Act* and Section 10 of the *Rivers and Harbors Act of 1899*; and that the project proponent has recently submitted a permit modification package to your office which will require additional NEPA review and re-initiation of several federal consultations including Section 7 of the Endangered Species Act.

DOE requests that you participate as a cooperating agency in the development of the DOE EA to prevent duplication of efforts by our agencies, and to encourage information sharing and integration of agency processes. In addition, since your agency previously conducted required consultations for the Proposed Project, DOE recommends that re-initiation of these consultations, due to the project modifications, are conducted jointly between DOE and your agency as joint action agencies.

Please respond regarding your interest in participating as a cooperating agency at your earliest convenience. Please contact Ms. Lori Gray, NEPA Division Director, of my staff at lori.gray@ee.doe.gov or 720-356-1568, if you have any questions or need further information on the project.

Sincerely,

FOR Carol J. Battershell
Manager

cc via email:
Lori Gray, DOE
Michael Hahn, DOE
Samuel L. Reynolds, USACE
Lawrence M. Slavitter, USACE
Nicole C. Minnichbach, USACE

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT CORPS OF ENGINEERS
WANAMAKER BUILDING, 100 PENN SQUARE EAST
PHILADELPHIA. PENNSYLVANIA 19107-3390

REPLY TO
ATTENTION OF

JAN 21 2015

Regulatory Branch
Applications Section II

SUBJECT: CENAP-OP-R-2008-0777-39
Fishermen's Energy, LLC

Ms. Carol J. Battershell
Department of Energy
Golden Field Office
15013 Denver West Highway
Golden, Colorado 80401

Dear Ms. Battershell:

This is in response to your letter dated December 15, 2014, inviting the United States Army Corps of Engineers (Corps), Philadelphia District, to participate as a cooperating agency in the development of an Environmental Assessment (EA) associated with the proposal of Fishermen's Energy, LLC to construct a maximum of six (6) wind turbines approximately 2.8 nautical miles east of Atlantic City, Atlantic County, New Jersey

The Philadelphia District is accepting your invitation to serve as a cooperating agency in the development of the EA. By participating as a cooperating agency, the Corps can work with the Department of Energy to ensure that sufficient information is included in the EA for the Corps to adopt the environmental document, conduct a timely review of the Fishermen's Energy application, and make a final decision with respect to project compliance with Section 10 of the River and Harbor Act of 1899 and Section 404 of the Clean Water Act.

We are looking forward to working with you as a cooperating agency. If you have any questions regarding this matter, please contact Mr. Lawrence M. Slavitter at (215) 656-6734

Sincerely,

Frank J. Cianfrani
Chief, Regulatory Branch

Copy Furnished:

NMFS (Sandy Hook, NJ)
NMFS (Gloucester, MA)
USEPA, Region II (New York, NY)-Lingard Knutson
USFWS (Pleasantville, NJ)
USCG, 5th District (Portsmith, VA)

Department of Energy
Golden Field Office
15013 Denver West Parkway
Golden, Colorado 80401

February 9, 2015

John K. Bullard
Regional Administrator
Greater Atlantic Regional Fisheries Office
National Marine Fisheries Service
Northeast Region
55 Great Republic Drive
Gloucester, MA 01930-2276

SUBJECT: DOE and USACE Request for Re-Initiation of the Section 7 Endangered Species Act Informal Consultation for Fishermen's Atlantic City Windfarm, LLC

Dear Mr. Bullard:

The U.S. Department of Energy (DOE) is proposing to provide funding to Fishermen's Atlantic City Windfarm, LLC (project proponent) to support the development of an offshore wind renewable energy facility (proposed project) within New Jersey state waters, located approximately 2.8 miles off the New Jersey coast from Atlantic City. The U.S. Army Corps of Engineers, Philadelphia District (USACE) has regulatory and permitting authority for this proposed project under Section 404 of the *Clean Water Act* and Section 10 of the *Rivers and Harbors Act of 1899*. The USACE issued Department of the Army Permit CENAP-OP-R-2008-0777-39 for this proposed project on June 14, 2013. Since issuance of the USACE permit, the project plans have been refined and a permit modification package has been submitted to the USACE. The USACE is proposing to process a modification to that permit.

The proposed project would consist of the construction, operation, maintenance, and eventual decommissioning of up to six wind turbine generators that would generate a maximum of approximately 25 megawatts (MW) of electricity, a 33-kilovolt (kV) alternating current (AC) submarine cable interconnecting the turbines, a 33-kV AC submarine transmission cable (export cable), and a 33-kV AC underground cable (onshore interconnection cable) that would connect the proposed project with existing onshore infrastructure in Atlantic City, New Jersey.

The following Federally listed species could potentially be impacted by the proposed project: Atlantic right whale (*Eubalaena glacialis*), humpback whale (*Megaptera novaengliae*), fin whale (*Balaenoptera physalus*), sei whale (*Balaenoptera borealis*), blue whale (*Balaenopera musculus*), sperm whale (*Physter microcephalus*), Kemp's ridley sea turtle (*Lepidochelys kempii*), loggerhead sea turtle (*Caretts caretta*), green sea turtle (*Chelonia mydas*), leatherback sea turtle (*Dermochelys coriacea*), hawksbill sea turtles (*Eretmochelys imbricate*), Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*) and the Shortnose Sturgeon (*Acipenser brevirostrum*).

The USACE previously completed consultation pursuant to section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 et seq.), with your office for permitting of the proposed project and determined that the proposed project is not likely to adversely affect any species listed as threatened or endangered under your jurisdiction. This determination was based on a biological assessment submitted during the consultation process. On May 22, 2012 your office concurred with this determination. A copy of this concurrence is attached (Enclosure 1). Since this concurrence, the following changes have occurred:

- A permit modification package has been submitted to the USACE. The USACE plans to issue a Public Notice to solicit comments and recommendations from the public concerning modification of the Department of the Army permit. The USACE will include your office on the distribution list to be notified when the Public Notice is published.
- The New York Bight, Chesapeake Bay, Carolina and South Atlantic Distinct Population Segments (DPSs) of Atlantic sturgeon were listed as endangered, and the Gulf of Maine DPS was listed as threatened under the ESA on April 6, 2012.
- DOE is completing an Environmental Assessment (EA) for the proposed project under the National Environmental Policy Act (NEPA) and the USACE is a cooperating agency. DOE will include your office on the distribution list to be notified when the draft EA is posted for the public comment period.

To streamline the NEPA process and to avoid redundancy, DOE and USACE have decided to jointly re-initiate Section 7 consultation for the proposed project. A biological assessment prepared by DOE is attached (Enclosure 2). This assessment addresses the modifications to the proposed project that have occurred since the completion of the initial USACE led Section 7 consultation and it addresses the potential effects of the proposed project modifications on the listed species.

DOE, as the lead federal agency and USACE, as the permitting agency, have reviewed the proposed project changes and the biological assessment and determined that their respective actions of funding and modifying the permit for the proposed project *may affect but is not likely to adversely affect* the following listed species: Atlantic right whale (*Eubalaena glacialis*), humpback whale (*Megaptera novaengliae*), fin whale (*Balaenoptera physalus*), sei whale (*Balaenoptera borealis*), blue whale (*Balaenopera musculus*), sperm whale (*Physter microcephalus*), Kemp's ridley sea turtle (*Lepidochelys kempii*), loggerhead sea turtle (*Caretts caretta*), green sea turtle (*Chelonia mydas*), leatherback sea turtle (*Dermochelys coriacea*), hawksbill sea turtles (*Eretmochelys imbricate*), Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*) and the Shortnose Sturgeon (*Acipenser brevirostrum*) with the inclusion of the Department of the Army special permit conditions (Enclosure 3):

DOE and USACE respectfully request your concurrence with their determination. Please send any correspondence to:

U.S. Department of Energy
Golden Field Office
Attn: Ms. Lori Gray
NEPA Division Director
15013 Denver West Parkway
Golden, CO 80401

U.S. Army Corps of Engineers
Regulatory Branch, Philadelphia District
Attn: Mr. Lawrence M. Slavitter
Wanamaker Building
100 Penn Square East
Philadelphia, PA 19107-3390

If you have any questions or require any additional information, please contact Lori Gray at (720)356-1568 or lori.gray@ee.doe.gov or Larry Slavitter, USACE at 215-655-6734 or Lawrence.M.Slavitter@usace.army.mil.

Sincerely,

Timothy Meeks
Acting Director

Enclosures: as stated

Electronic cc:
Karen Greene, HCD Sandy Hook
Julie Crocker, PRD
Michael Hahn, DOE
Roak Parker, DOE
Lawrence M Slavitter, USACE

Department of Energy
Golden Field Office
15013 Denver West Parkway
Golden, Colorado 80401

February 9, 2015

Karen Greene
United States Department of Commerce
National Oceanic and Atmospheric Administration
Fisheries Service, Habitat Conservation Division
NEFSC James J. Howard
Marine Sciences Laboratory
74 Magruder Road, Sandy Hook
Highlands, NJ 07732

SUBJECT: DOE and USACE Request for Re-Initiation of the Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for Fishermen's Atlantic City Windfarm, LLC

Dear Ms. Greene:

The U.S. Department of Energy (DOE) is proposing to provide funding to Fishermen's Atlantic City Windfarm, LLC (project proponent) to support the development of an offshore wind renewable energy facility (proposed project) within New Jersey state waters, located approximately 2.8 miles off the New Jersey coast from Atlantic City. The U.S. Army Corps of Engineers, Philadelphia District (USACE) has regulatory and permitting authority for this proposed project under Section 404 of the *Clean Water Act* and Section 10 of the *Rivers and Harbors Act of 1899*. The USACE issued Department of the Army Permit CENAP-OP-R-2008-0777-39 for this proposed project on June 14, 2013. Since issuance of the USACE permit, the project plans have been refined and a permit modification package has been submitted to the USACE. The USACE is proposing to process a modification to that permit.

The proposed project would consist of the construction, operation, maintenance, and eventual decommissioning of up to six wind turbine generators that would generate a maximum of approximately 25 megawatts (MW) of electricity, a 33-kilovolt (kV) alternating current (AC) submarine cable interconnecting the turbines, a 33-kV AC submarine transmission cable (export cable), and a 33-kV AC underground cable (onshore interconnection cable) that would connect the proposed project with existing onshore infrastructure in Atlantic City, New Jersey.

The project area has been designated as Essential Fish Habitat (EFH) for a wide variety of federally managed species. The USACE previously completed an EFH consultation with your office for permitting of the proposed project and determined that the installation of the proposed project would have limited adverse effects on EFH, and the species of concern. This determination was based on a 2011 EFH assessment, completed by Normandeau Associates Inc. which was submitted to your office during the consultation process. On June 27, 2011 your office concurred with this determination. A copy of this concurrence is attached (Enclosure 1). Since this concurrence, the following changes have occurred:

- A permit modification package has been submitted to the USACE. The USACE plans to issue a Public Notice to solicit comments and recommendations from the public concerning modification of the Department of the Army permit. The USACE will include your office on the distribution list to be notified when the Public Notice is published.
- The New York Bight, Chesapeake Bay, Carolina and South Atlantic Distinct Population Segments (DPSs) of Atlantic sturgeon were listed as endangered, and the Gulf of Maine DPS was listed as threatened under the ESA on April 6, 2012.
- DOE is completing an Environmental Assessment (EA) for the proposed project under the National Environmental Policy Act (NEPA) and the USACE is a cooperating agency. DOE will include your office on the distribution list to be notified when the draft EA is posted for the public comment period.

To streamline the NEPA process and to avoid redundancy, DOE and USACE have decided to jointly re-initiate EFH consultation for the proposed project. A summary of proposed changes to the project description are attached (Enclosure 2). A revised EFH Assessment is attached (Enclosure 3) which addresses the proposed changes to the turbine foundations and the undersea cables, and how those changes could potentially impact the findings of the 2011 EFH Assessment.

DOE, as the funding agency, and USACE, as the permitting agency, have reviewed the proposed project changes and the revised EFH Assessment and determined that their respective actions of funding and modifying the permit for the proposed project would have limited adverse effects on EFH, and the species of concern due to the installation and eventual decommissioning of the project.

DOE and USACE respectfully request your concurrence with their determination. Please send any correspondence to:

U.S. Department of Energy
Golden Field Office
Attn: Ms. Lori Gray
NEPA Division Director
15013 Denver West Parkway
Golden, CO 80401

U.S. Army Corps of Engineers
Regulatory Branch, Philadelphia District
Attn: Mr. Lawrence M. Slavitter
Wanamaker Building
100 Penn Square East
Philadelphia, PA 19107-3390

For your information, the project proponent will coordinate with the National Marine Fisheries Services, Office of Protected Resources to obtain necessary authorizations under the Marine Mammal Protection Act if needed.

If you have any questions or require any additional information, please contact Lori Gray at (720)356-1568 or lori.gray@ee.doe.gov or Larry Slavitter, USACE at 215-655-6734 or Lawrence.M.Slavitter@usace.army.mil.

Sincerely,

Timothy Meeks
Acting Director

Enclosures: as stated

Electronic cc:
Julie Crocker, PRD
Michael Hahn, DOE
Lori Gray, DOE
Roak Parker, DOE
Lawrence M Slavitter, USACE

Department of Energy
Golden Field Office
15013 Denver West Parkway
Golden, Colorado 80401

February 9, 2015

Richard Ruvo, Director
Air Programs Branch
United States Environmental Protection Agency
Region 2
290 Broadway
New York, NY 10007-1866

SUBJECT: General Conformity Analysis for Fishermen's Atlantic City Windfarm, LLC – Project Revisions

Dear Mr. Ruvo:

The U.S. Department of Energy (DOE) is proposing to provide funding to Fishermen's Atlantic City Windfarm, LLC (project proponent) to support the development of an offshore wind renewable energy facility (proposed project) within New Jersey state waters, located approximately 2.8 miles off the New Jersey coast from Atlantic City. The U.S. Army Corps of Engineers, Philadelphia District (USACE) has regulatory and permitting authority for this proposed project under Section 404 of the *Clean Water Act* and Section 10 of the *Rivers and Harbors Act of 1899*. The USACE issued Department of the Army Permit CENAP-OP-R-2008-0777-39 for this proposed project on June 14, 2013. Since issuance of the USACE permit, the project plans have been refined and a permit modification package has been submitted to the USACE. The USACE is proposing to process a modification to that permit.

The proposed project would consist of the construction, operation, maintenance, and eventual decommissioning of up to six wind turbine generators that would generate a maximum of approximately 25 megawatts (MW) of electricity, a 33-kilovolt (kV) alternating current (AC) submarine cable interconnecting the turbines, a 33-kV AC submarine transmission cable (export cable), and a 33-kV AC underground cable (onshore interconnection cable) that would connect the proposed project with existing onshore infrastructure in Atlantic City, New Jersey.

The project area is within the Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE non-attainment area for the ozone National Ambient Air Quality Standards. The USACE previously coordinated a review of a General Conformity Applicability Analysis dated October 10, 2011 (Enclosure 1) for this project with your office. The determination was that the calculated emissions for the project are less than the General Conformity applicability thresholds for both construction and operations. Because the calculated emissions are less than the de minimis emission levels, the project is not subject to the General Conformity provision.

Since completion of your review, the following changes have occurred:

- A permit modification package has been submitted to the USACE. The USACE plans to issue a Public Notice to solicit comments and recommendations from the public concerning modification of the Department of the Army permit. The USACE will include your office on the distribution list to be notified when the Public Notice is published.
- DOE is completing an Environmental Assessment (EA) for the proposed project under the National Environmental Policy Act (NEPA) and the USACE is a cooperating agency. DOE will include your office on the distribution list to be notified when the draft EA is posted for the public comment period.

A summary of proposed changes to the project description is attached (Enclosure 2). A current project construction schedule is attached (Enclosure 3). DOE, as the funding agency, and USACE, as the permitting agency, have reviewed the proposed project changes and determined the changes do not impact the analysis since there will be no new types of vessels used, and no increase in vessel size or in the number of vessels to be used in association with the change in foundation type.

If you have any questions or require any additional information, please contact Lori Gray at (720)356-1568 or lori.gray@ee.doe.gov or Larry Slavitter, USACE at 215-655-6734 or Lawrence.M.Slavitter@usace.army.mil.

Please send any correspondence to:

U.S. Department of Energy
Golden Field Office
Attn: Ms. Lori Gray
NEPA Division Director
15013 Denver West Parkway
Golden, CO 80401

U.S. Army Corps of Engineers
Regulatory Branch, Philadelphia District
Attn: Mr. Lawrence M. Slavitter
Wanamaker Building
100 Penn Square East
Philadelphia, PA 19107-3390

Sincerely,

Timothy Meeks
Acting Director

Enclosures: as stated

Electronic cc:

Lingard Knutson, USEPA
Matthew Laurita, USEPA
Michael Hahn, DOE
Lori Gray, DOE
Roak Parker, DOE
Lawrence M Slavitter, USACE

Department of Energy
Golden Field Office
15013 Denver West Parkway
Golden, Colorado 80401

February 17, 2015

Daniel Saunders
Deputy State Historic Preservation Officer
Mail Code 501-04B
State of New Jersey
Department of Environmental Protection
Historic Preservation Office
PO Box 420
Trenton, NJ 08625-0420

SUBJECT: DOE and USACE Request for Re-Initiation of Section 106 Consultation for Fishermen's Atlantic City Windfarm, LLC - HPO project number 08-1708

Pursuant to Section 106 of the *National Historic Preservation Act* of 1966 (NHPA) as amended, and its associated implementing regulations codified at 36 CFR Part 800, the U.S. Department of Energy (DOE) requests initiation of consultation with your office on the effects of DOE providing funding to Fishermen's Atlantic City Windfarm, LLC (project proponent) to support the development of an offshore wind renewable energy facility (Proposed Project) located approximately 2.8 miles off the New Jersey coast from Atlantic City. The Proposed Project would consist of the construction, operation, maintenance, and eventual decommissioning of up to six wind turbine generators that would generate a maximum of approximately 25 megawatts (MW) of electricity, a 33-kilovolt (kV) alternating current (AC) submarine cable interconnecting the turbines, a 33-kV AC submarine transmission cable (export cable), and a 33-kV AC underground cable (onshore interconnection cable) that would connect the project with existing onshore infrastructure in Atlantic City, New Jersey.

Background

The U.S. Army Corps of Engineers, Philadelphia District (USACE) previously completed Section 106 consultation (HPO project number 08-1708) for portions of this project and issued Department of the Army Permit CENAP-OP-R-2008-0777-39 for the Proposed Project on June 14, 2013.

The USACE previously determined that no historic properties would be affected by the Proposed Project. This determination was based on the following reports that were provided to your office by the USACE:

- *Marine Geophysical Survey in Support of an Offshore Wind Farm and Cable Route Construction, Atlantic City, Jew Jersey,* prepared for Fishermen's Energy of New Jersey, LLC by Alpine Ocean Seismic Survey, Inc. and Fathom Research, LLC dated March 18, 2011.

- *(Draft) Phase I Marine Archaeological Survey, Fishermen's Energy Project, Atlantic City, Atlantic County, New Jersey,* prepared by Fathom Research, LLC dated April 2011.

On May 17, 2011 your office concurred with the determination that no historic properties would be affected. Since this concurrence, the following changes have occurred:

- A permit modification package has been submitted to the USACE. The USACE plans to issue a Public Notice to solicit comments and recommendations from the public concerning modification of the Department of the Army permit. The USACE will include your office on the distribution list to be notified when the Public Notice is published.
- DOE is completing an Environmental Assessment (EA) for the proposed project under the *National Environmental Policy Act* (NEPA) and the USACE is a cooperating agency. DOE will include your office on the distribution list to be notified when the draft EA is posted for the public comment period.

To streamline the NEPA process and to avoid redundancy, DOE and USACE have decided to jointly re-initiate the Section 106 process for the Proposed Project. DOE has been designated as the lead action agency under NEPA for this project.

Project Description
A detailed project description is attached which includes the proposed changes to the project since USACE completed Section 106 consultation (Enclosure 1).

Undertaking
DOE has determined that providing funding to support the development of the Proposed Project constitutes an undertaking subject to Section 106 of the NHPA.

Area of Potential Effect
Consideration has been given to the potential for a range of effects in addition to direct effects that might result from the undertaking, including visual effects.

DOE has defined the area of potential effect (APE) to include the total ocean area considered as the project area which is approximately 170 acres (calculated as the perimeter around the group of turbines, approximately 200 feet in each direction) plus a 5 foot width along the length of the export cable route from the turbines to the shore; and the on-shore portion of the project which is located within a 20-foot-wide easement beneath an approximate 6,500-foot section of the western (southbound) lane of South and North Tennessee Avenues in Atlantic City, New Jersey for the underground cable to be installed that connects the project to existing infrastructure at the Huron Substation, located along Abescon Avenue in Atlantic City, New Jersey. The APE also includes the coastline between Ventnor City and Atlantic City, NJ for potential visual impacts.

Historic Properties Affected
Per 36 CFR 800.4, DOE is required to identify all properties listed, or eligible for listing in the National Register of Historic Places which may be affected by the proposed undertaking. As discussed above two documents were submitted, during the USACE Section 106 consultation, which covered the marine portion of the APE. From this information, it was determined that no historic properties would be affected by the marine portion of the Proposed Project.

A Phase Ia Archaeological Survey for the onshore APE was completed for the project (Enclosure 2). Research performed for this survey indicates that there is no prehistoric archaeological potential within the APE due to disturbances associated with utility and building construction and indicates that the APE is under existing roadways. The research also determined there were no historic buildings or structures formerly present within the APE; and that there is no historic archaeological potential.

In addition, a viewshed analysis report has been completed for the Proposed Project (Enclosure 3). Based upon the photographs generated with the overlying depiction of the turbines and their respective size and location in relation to the various historically sensitive areas investigated as part of the viewshed analysis, it was determined the turbines will only be visible from six National/and/or State Registered Historic Places between Ventnor City and Atlantic City, NJ. In all of these locations, the turbines on the horizon will appear as structures that will be much smaller in comparison to surrounding structures and therefore will not diminish the integrity of any of these properties significant historic features.

Assessment of Effect

Based on information in the Phase Ia Archaeological Survey (enclosed) for onshore components and the viewshed analysis (enclosed); and the information submitted during the previous USACE Section 106 consultation, DOE, as the funding agency, and USACE, as the permitting agency, have determined that no historic properties would be adversely affected by their respective actions of funding and modifying the permit for the proposed project.

DOE and USACE respectfully request your concurrence in their conclusion that no historic properties would be adversely affected by their funding and permitting actions. Please send any correspondence to:

U.S. Department of Energy
Golden Field Office
Attn: Ms. Lori Gray
NEPA Division Director
15013 Denver West Parkway
Golden, CO 80401

U.S. Army Corps of Engineers
Regulatory Branch, Philadelphia District
Attn: Ms. Nicole Minnichbach
Cultural Resource Specialist/Tribal Liaison
Wanamaker Building
100 Penn Square East
Philadelphia, PA 19107-3390

If you have any questions or require any additional information, please contact Lori Gray at (720)356-1568 or lori.gray@ee.doe.gov or Nicole Minnichbach, USACE at 215-656-6556 or Nicole.C.Minnichbach@usace.army.mil.

Sincerely,

Timothy Meeks
Acting Director

Enclosures: as stated

Electronic cc:
Lori Gray, DOE
Michael Hahn, DOE
Roak Parker, DOE
Nicole Cooper Minnichbach, USACE
Lawrence M Slavitter, USACE

Department of Energy
Golden Field Office
15013 Denver West Parkway
Golden, Colorado 80401

February 17, 2015

Jesse Bergevin
Tribal Historic Preservation Officer
The Oneida Indian Nation
2037 Dream Catcher Plaza
Oneida, NY 13421

SUBJECT: DOE and USACE Request for Re-Initiation of Section 106 Consultation for Fishermen's Atlantic City Windfarm, LLC

Dear Mr. Bergevin:

I am contacting you to re-open the consultation process with regards to an offshore wind project that is within your Tribal area of interest. Pursuant to Section 106 of the *National Historic Preservation Act* of 1966 (NHPA) as amended, the U.S. Department of Energy (DOE) is initiating the consultation process to determine any potential effects on Tribal properties of traditional religious and cultural significance.

DOE is proposing to provide funding to Fishermen's Atlantic City Windfarm, LLC (project proponent) to support the development of an offshore wind renewable energy facility (Proposed Project) located approximately 2.8 miles off the New Jersey coast from Atlantic City. The Proposed Project would consist of the construction, operation, maintenance, and eventual decommissioning of up to six wind turbine generators that would generate a maximum of approximately 25 megawatts (MW) of electricity, a 33-kilovolt (kV) alternating current (AC) submarine cable interconnecting the turbines, a 33-kV AC submarine transmission cable (export cable), and a 33-kV AC underground cable (onshore interconnection cable) that would connect the project with existing onshore infrastructure in Atlantic City, New Jersey.

The U.S. Army Corps of Engineers, Philadelphia District (USACE) previously contacted you about permitting of the Proposed Project pursuant to Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act. Enclosed is a copy of the USACE correspondence dated March 4, 2011 for your use (Enclosure 1). Since March 2011, the following changes have occurred:

- A permit modification package has been submitted to the USACE. The USACE plans to issue a Public Notice to solicit comments and recommendations from the public concerning modification of the Department of the Army permit. The USACE will include you on the distribution list to be notified when the Public Notice is published.

- DOE is completing an Environmental Assessment (EA) for the proposed project under the *National Environmental Policy Act* (NEPA) and the USACE is a cooperating agency. DOE will include you on the distribution list to be notified when the draft EA is posted for the public comment period.

- A Phase Ia Archaeological Survey for the onshore area of potential effect (APE) was completed for the project and is enclosed for your use (Enclosure 2).
  - Research performed for this survey indicates that there is no prehistoric archaeological potential within the APE due to disturbances associated with utility and building construction. The APE is under existing roadways.
  - The research also determined there were no historic buildings or structures formerly present within the APE; and that there is no historic archaeological potential.

To streamline the consultation process and to avoid redundancy, DOE and USACE have decided to jointly re-initiate consultation with you. Our goal is to avoid inadvertently impacting traditional cultural properties, burials, and lands with significance to the Tribe(s) and Nation(s), pursuant to Section 106 of the NHPA.

To inform the consultation process, attached for your use is a detailed project description (Enclosure 3) which includes the proposed changes to the project since the USACE contacted you in March 2011. Also enclosed are excerpts from a viewshed analysis report that has been completed for the project (Enclosure 4).

DOE and USACE are inquiring if the Tribe has any concerns with regards to resources of religious and cultural significance (e.g. traditional cultural properties) that could be impacted by the Proposed Project?

If you have any questions or require additional information, please contact Lori Gray at (720)356-1568 or lori.gray@ee.doe.gov or Nicole Minnichbach, USACE at 215-656-6556 or Nicole.C.Minnichbach@usace.army.mil.

Please provide your response to this inquiry within 30 days of receipt of this letter to help us move the process forward. Correspondence should be directed to:

U.S. Department of Energy
Golden Field Office
Attn: Ms. Lori Gray
NEPA Division Director
15013 Denver West Parkway
Golden, CO 80401

U.S. Army Corps of Engineers
Regulatory Branch, Philadelphia District
Attn: Ms. Nicole Minnichbach
Cultural Resource Specialist/Tribal Liaison
Wanamaker Building
100 Penn Square East
Philadelphia, PA 19107-3390

If it is more convenient for you, please feel free to provide your comments via e-mail to Lori and Nicole at the email addresses provided above. I look forward to working with you and

addressing any concerns your Tribe may have related to the Fishermen's Atlantic City Windfarm.

Sincerely,

Timothy Meeks
Acting Director

Enclosures: as stated

Electronic cc:
Lori Gray, DOE
Michael Hahn, DOE
Roak Parker, DOE
Nicole Cooper Minnichbach, USACE
Lawrence M Slavitter, USACE

Department of Energy
Golden Field Office
15013 Denver West Parkway
Golden, Colorado 80401

February 17, 2015

Nekole Alligood
Cultural Preservation Director
The Delaware Nation
31064 State Highway 281
P.O. Box 825
Anadarko, Oklahoma 73005

SUBJECT: DOE and USACE Request for Re-Initiation of Section 106 Consultation for Fishermen's Atlantic City Windfarm, LLC

Dear Ms. Alligood:

I am contacting you to re-open the consultation process with regards to an offshore wind project that is within your Tribal area of interest. Pursuant to Section 106 of the *National Historic Preservation Act* of 1966 (NHPA) as amended, the U.S. Department of Energy (DOE) is initiating the consultation process to determine any potential effects on Tribal properties of traditional religious and cultural significance.

DOE is proposing to provide funding to Fishermen's Atlantic City Windfarm, LLC (project proponent) to support the development of an offshore wind renewable energy facility (Proposed Project) located approximately 2.8 miles off the New Jersey coast from Atlantic City. The Proposed Project would consist of the construction, operation, maintenance, and eventual decommissioning of up to six wind turbine generators that would generate a maximum of approximately 25 megawatts (MW) of electricity, a 33-kilovolt (kV) alternating current (AC) submarine cable interconnecting the turbines, a 33-kV AC submarine transmission cable (export cable), and a 33-kV AC underground cable (onshore interconnection cable) that would connect the project with existing onshore infrastructure in Atlantic City, New Jersey.

The U.S. Army Corps of Engineers, Philadelphia District (USACE) previously contacted you about permitting of the Proposed Project pursuant to Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act. Enclosed is a copy of the USACE correspondence dated March 4, 2011 for your use and your response (Enclosure 1). Since March 2011, the following changes have occurred:

- A permit modification package has been submitted to the USACE. The USACE plans to issue a Public Notice to solicit comments and recommendations from the public concerning modification of the Department of the Army permit. The USACE will include you on the distribution list to be notified when the Public Notice is published.

- DOE is completing an Environmental Assessment (EA) for the proposed project under the *National Environmental Policy Act* (NEPA) and the USACE is a cooperating agency. DOE will include you on the distribution list to be notified when the draft EA is posted for the public comment period.

- A Phase Ia Archaeological Survey for the onshore area of potential effect (APE) was completed for the project and is enclosed for your use (Enclosure 2).
    - Research performed for this survey indicates that there is no prehistoric archaeological potential within the APE due to disturbances associated with utility and building construction. The APE is under existing roadways.
    - The research also determined there were no historic buildings or structures formerly present within the APE; and that there is no historic archaeological potential.

To streamline the consultation process and to avoid redundancy, DOE and USACE have decided to jointly re-initiate consultation with you. Our goal is to avoid inadvertently impacting traditional cultural properties, burials, and lands with significance to the Tribe(s) and Nation(s), pursuant to Section 106 of the NHPA.

To inform the consultation process, attached for your use is a detailed project description (Enclosure 3) which includes the proposed changes to the project since the USACE contacted you in March 2011. Also enclosed are excerpts from a viewshed analysis report that has been completed for the project (Enclosure 4).

DOE and USACE are inquiring if the Tribe has any concerns with regards to resources of religious and cultural significance (e.g. traditional cultural properties) that could be impacted by the Proposed Project?

If you have any questions or require additional information, please contact Lori Gray at (720)356-1568 or lori.gray@ee.doe.gov or Nicole Minnichbach, USACE at 215-656-6556 or Nicole.C.Minnichbach@usace.army.mil.

Please provide your response to this inquiry within 30 days of receipt of this letter to help us move the process forward. Correspondence should be directed to:

U.S. Department of Energy
Golden Field Office
Attn: Ms. Lori Gray
NEPA Division Director
15013 Denver West Parkway
Golden, CO 80401

U.S. Army Corps of Engineers
Regulatory Branch, Philadelphia District
Attn: Ms. Nicole Minnichbach
Cultural Resource Specialist/Tribal Liaison
Wanamaker Building
100 Penn Square East
Philadelphia, PA 19107-3390

If it is more convenient for you, please feel free to provide your comments via e-mail to Lori and Nicole at the email addresses provided above. I look forward to working with you and

addressing any concerns your Tribe may have related to the Fishermen's Atlantic City Windfarm.

Sincerely,

Timothy Meeks
Acting Director

Enclosures: as stated

Electronic cc:
Lori Gray, DOE
Michael Hahn, DOE
Roak Parker, DOE
Nicole Cooper Minnichbach, USACE
Lawrence M Slavitter, USACE

Department of Energy
Golden Field Office
15013 Denver West Parkway
Golden, Colorado 80401

February 17, 2015

Brice Obermeyer, PhD
Tribal Historic Preservation Officer
The Delaware Tribe
1200 Commercial Street
Roosevelt Hall, Room 212
Emporia State University
Emporia, KS 66801

SUBJECT: DOE and USACE Request for Re-Initiation of Section 106 Consultation for Fishermen's Atlantic City Windfarm, LLC

Dear Dr. Obermeyer:

I am contacting you to re-open the consultation process with regards to an offshore wind project that is within your Tribal area of interest. Pursuant to Section 106 of the *National Historic Preservation Act* of 1966 (NHPA) as amended, the U.S. Department of Energy (DOE) is initiating the consultation process to determine any potential effects on Tribal properties of traditional religious and cultural significance.

DOE is proposing to provide funding to Fishermen's Atlantic City Windfarm, LLC (project proponent) to support the development of an offshore wind renewable energy facility (Proposed Project) located approximately 2.8 miles off the New Jersey coast from Atlantic City. The Proposed Project would consist of the construction, operation, maintenance, and eventual decommissioning of up to six wind turbine generators that would generate a maximum of approximately 25 megawatts (MW) of electricity, a 33-kilovolt (kV) alternating current (AC) submarine cable interconnecting the turbines, a 33-kV AC submarine transmission cable (export cable), and a 33-kV AC underground cable (onshore interconnection cable) that would connect the project with existing onshore infrastructure in Atlantic City, New Jersey.

The U.S. Army Corps of Engineers, Philadelphia District (USACE) previously contacted you about permitting of the Proposed Project pursuant to Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act. Enclosed is a copy of the USACE correspondence dated March 4, 2011 for your use and your response (Enclosure 1). Since March 2011, the following changes have occurred:

- A permit modification package has been submitted to the USACE. The USACE plans to issue a Public Notice to solicit comments and recommendations from the public concerning modification of the Department of the Army permit. The USACE will include you on the distribution list to be notified when the Public Notice is published.

- DOE is completing an Environmental Assessment (EA) for the proposed project under the *National Environmental Policy Act* (NEPA) and the USACE is a cooperating agency. DOE will include you on the distribution list to be notified when the draft EA is posted for the public comment period.

- A Phase Ia Archaeological Survey for the onshore area of potential effect (APE) was completed for the project and is enclosed for your use (Enclosure 2).
    - Research performed for this survey indicates that there is no prehistoric archaeological potential within the APE due to disturbances associated with utility and building construction. The APE is under existing roadways.
    - The research also determined there were no historic buildings or structures formerly present within the APE; and that there is no historic archaeological potential.

To streamline the consultation process and to avoid redundancy, DOE and USACE have decided to jointly re-initiate consultation with you. Our goal is to avoid inadvertently impacting traditional cultural properties, burials, and lands with significance to the Tribe(s) and Nation(s), pursuant to Section 106 of the NHPA.

To inform the consultation process, attached for your use is a detailed project description (Enclosure 3) which includes the proposed changes to the project since the USACE contacted you in March 2011. Also enclosed are excerpts from a viewshed analysis report that has been completed for the project (Enclosure 4).

DOE and USACE are inquiring if the Tribe has any concerns with regards to resources of religious and cultural significance (e.g. traditional cultural properties) that could be impacted by the Proposed Project?

If you have any questions or require additional information, please contact Lori Gray at (720)356-1568 or lori.gray@ee.doe.gov or Nicole Minnichbach, USACE at 215-656-6556 or Nicole.C.Minnichbach@usace.army.mil.

Please provide your response to this inquiry within 30 days of receipt of this letter to help us move the process forward. Correspondence should be directed to:

U.S. Department of Energy
Golden Field Office
Attn: Ms. Lori Gray
NEPA Division Director
15013 Denver West Parkway
Golden, CO 80401

U.S. Army Corps of Engineers
Regulatory Branch, Philadelphia District
Attn: Ms. Nicole Minnichbach
Cultural Resource Specialist/Tribal Liaison
Wanamaker Building
100 Penn Square East
Philadelphia, PA 19107-3390

If it is more convenient for you, please feel free to provide your comments via e-mail to Lori and Nicole at the email addresses provided above. I look forward to working with you and

addressing any concerns your Tribe may have related to the Fishermen's Atlantic City Windfarm.

Sincerely,

Timothy Meeks
Acting Director

Enclosures: as stated

Electronic cc:
Lori Gray, DOE
Michael Hahn, DOE
Roak Parker, DOE
Nicole Cooper Minnichbach, USACE
Lawrence M Slavitter, USACE

Department of Energy
Golden Field Office
15013 Denver West Parkway
Golden, Colorado 80401

February 17, 2015

Robin Dushane
Cultural Preservation Director
The Eastern Shawnee Tribe of Oklahoma
12705 S. 705 Road
Wyandotte, Oklahoma 74370

SUBJECT: DOE and USACE Request for Re-Initiation of Section 106 Consultation for Fishermen's Atlantic City Windfarm, LLC

Dear Ms. Dushane:

I am contacting you to re-open the consultation process with regards to an offshore wind project that is within your Tribal area of interest. Pursuant to Section 106 of the *National Historic Preservation Act* of 1966 (NHPA) as amended, the U.S. Department of Energy (DOE) is initiating the consultation process to determine any potential effects on Tribal properties of traditional religious and cultural significance.

DOE is proposing to provide funding to Fishermen's Atlantic City Windfarm, LLC (project proponent) to support the development of an offshore wind renewable energy facility (Proposed Project) located approximately 2.8 miles off the New Jersey coast from Atlantic City. The Proposed Project would consist of the construction, operation, maintenance, and eventual decommissioning of up to six wind turbine generators that would generate a maximum of approximately 25 megawatts (MW) of electricity, a 33-kilovolt (kV) alternating current (AC) submarine cable interconnecting the turbines, a 33-kV AC submarine transmission cable (export cable), and a 33-kV AC underground cable (onshore interconnection cable) that would connect the project with existing onshore infrastructure in Atlantic City, New Jersey.

The U.S. Army Corps of Engineers, Philadelphia District (USACE) previously contacted you about permitting of the Proposed Project pursuant to Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act. Enclosed is a copy of the USACE correspondence dated March 4, 2011 for your use and your response (Enclosure 1). Since March 2011, the following changes have occurred:

- A permit modification package has been submitted to the USACE. The USACE plans to issue a Public Notice to solicit comments and recommendations from the public concerning modification of the Department of the Army permit. The USACE will include you on the distribution list to be notified when the Public Notice is published.

- DOE is completing an Environmental Assessment (EA) for the proposed project under the *National Environmental Policy Act* (NEPA) and the USACE is a cooperating agency. DOE will include you on the distribution list to be notified when the draft EA is posted for the public comment period.

- A Phase Ia Archaeological Survey for the onshore area of potential effect (APE) was completed for the project and is enclosed for your use (Enclosure 2).
    - Research performed for this survey indicates that there is no prehistoric archaeological potential within the APE due to disturbances associated with utility and building construction. The APE is under existing roadways.
    - The research also determined there were no historic buildings or structures formerly present within the APE; and that there is no historic archaeological potential.

To streamline the consultation process and to avoid redundancy, DOE and USACE have decided to jointly re-initiate consultation with you. Our goal is to avoid inadvertently impacting traditional cultural properties, burials, and lands with significance to the Tribe(s) and Nation(s), pursuant to Section 106 of the NHPA.

To inform the consultation process, attached for your use is a detailed project description (Enclosure 3) which includes the proposed changes to the project since the USACE contacted you in March 2011. Also enclosed are excerpts from a viewshed analysis report that has been completed for the project (Enclosure 4).

DOE and USACE are inquiring if the Tribe has any concerns with regards to resources of religious and cultural significance (e.g. traditional cultural properties) that could be impacted by the Proposed Project?

If you have any questions or require additional information, please contact Lori Gray at (720)356-1568 or lori.gray@ee.doe.gov or Nicole Minnichbach, USACE at 215-656-6556 or Nicole.C.Minnichbach@usace.army.mil.

Please provide your response to this inquiry within 30 days of receipt of this letter to help us move the process forward. Correspondence should be directed to:

U.S. Department of Energy
Golden Field Office
Attn: Ms. Lori Gray
NEPA Division Director
15013 Denver West Parkway
Golden, CO 80401

U.S. Army Corps of Engineers
Regulatory Branch, Philadelphia District
Attn: Ms. Nicole Minnichbach
Cultural Resource Specialist/Tribal Liaison
Wanamaker Building
100 Penn Square East
Philadelphia, PA 19107-3390

If it is more convenient for you, please feel free to provide your comments via e-mail to Lori and Nicole at the email addresses provided above. I look forward to working with you and

addressing any concerns your Tribe may have related to the Fishermen's Atlantic City Windfarm.

Sincerely,

Timothy Meeks
Acting Director

Enclosures: as stated

Electronic cc:
Lori Gray, DOE
Michael Hahn, DOE
Roak Parker, DOE
Nicole Cooper Minnichbach, USACE
Lawrence M Slavitter, USACE

Department of Energy
Golden Field Office
15013 Denver West Parkway
Golden, Colorado 80401

February 17, 2015

Sherry White
Tribal Historic Preservation Officer
Stockbridge-Munsee Community of Mohican Indians
W13447 Camp 14 Road
P.O. Box 70
Bowler, Wisconsin 54416

SUBJECT: DOE and USACE Request for Re-Initiation of Section 106 Consultation for Fishermen's Atlantic City Windfarm, LLC

Dear Ms. White:

I am contacting you to re-open the consultation process with regards to an offshore wind project that is within your Tribal area of interest. Pursuant to Section 106 of the *National Historic Preservation Act* of 1966 (NHPA) as amended, the U.S. Department of Energy (DOE) is initiating the consultation process to determine any potential effects on Tribal properties of traditional religious and cultural significance.

DOE is proposing to provide funding to Fishermen's Atlantic City Windfarm, LLC (project proponent) to support the development of an offshore wind renewable energy facility (Proposed Project) located approximately 2.8 miles off the New Jersey coast from Atlantic City. The Proposed Project would consist of the construction, operation, maintenance, and eventual decommissioning of up to six wind turbine generators that would generate a maximum of approximately 25 megawatts (MW) of electricity, a 33-kilovolt (kV) alternating current (AC) submarine cable interconnecting the turbines, a 33-kV AC submarine transmission cable (export cable), and a 33-kV AC underground cable (onshore interconnection cable) that would connect the project with existing onshore infrastructure in Atlantic City, New Jersey.

The U.S. Army Corps of Engineers, Philadelphia District (USACE) previously contacted you about permitting of the Proposed Project pursuant to Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act. Enclosed is a copy of the USACE correspondence dated March 4, 2011 for your use and your response (Enclosure 1). Since March 2011, the following changes have occurred:

- A permit modification package has been submitted to the USACE. The USACE plans to issue a Public Notice to solicit comments and recommendations from the public concerning modification of the Department of the Army permit. The USACE will include you on the distribution list to be notified when the Public Notice is published.

- DOE is completing an Environmental Assessment (EA) for the proposed project under the *National Environmental Policy Act* (NEPA) and the USACE is a cooperating agency. DOE will include you on the distribution list to be notified when the draft EA is posted for the public comment period.

- A Phase Ia Archaeological Survey for the onshore area of potential effect (APE) was completed for the project and is enclosed for your use (Enclosure 2).
  - Research performed for this survey indicates that there is no prehistoric archaeological potential within the APE due to disturbances associated with utility and building construction. The APE is under existing roadways.
  - The research also determined there were no historic buildings or structures formerly present within the APE; and that there is no historic archaeological potential.

To streamline the consultation process and to avoid redundancy, DOE and USACE have decided to jointly re-initiate consultation with you. Our goal is to avoid inadvertently impacting traditional cultural properties, burials, and lands with significance to the Tribe(s) and Nation(s), pursuant to Section 106 of the NHPA.

To inform the consultation process, attached for your use is a detailed project description (Enclosure 3) which includes the proposed changes to the project since the USACE contacted you in March 2011. Also enclosed are excerpts from a viewshed analysis report that has been completed for the project (Enclosure 4).

DOE and USACE are inquiring if the Tribe has any concerns with regards to resources of religious and cultural significance (e.g. traditional cultural properties) that could be impacted by the Proposed Project?

If you have any questions or require additional information, please contact Lori Gray at (720)356-1568 or lori.gray@ee.doe.gov or Nicole Minnichbach, USACE at 215-656-6556 or Nicole.C.Minnichbach@usace.army.mil.

Please provide your response to this inquiry within 30 days of receipt of this letter to help us move the process forward. Correspondence should be directed to:

U.S. Department of Energy
Golden Field Office
Attn: Ms. Lori Gray
NEPA Division Director
15013 Denver West Parkway
Golden, CO 80401

U.S. Army Corps of Engineers
Regulatory Branch, Philadelphia District
Attn: Ms. Nicole Minnichbach
Cultural Resource Specialist/Tribal Liaison
Wanamaker Building
100 Penn Square East
Philadelphia, PA 19107-3390

If it is more convenient for you, please feel free to provide your comments via e-mail to Lori and Nicole at the email addresses provided above. I look forward to working with you and

addressing any concerns your Tribe may have related to the Fishermen's Atlantic City Windfarm.

Sincerely,

Timothy Meeks
Acting Director

Enclosures: as stated

Electronic cc:
Lori Gray, DOE
Michael Hahn, DOE
Roak Parker, DOE
Nicole Cooper Minnichbach, USACE
Lawrence M Slavitter, USACE

Department of Energy
Golden Field Office
15013 Denver West Parkway
Golden, Colorado 80401

February 23, 2015

Eric Schrading
Field Office Supervisor
U.S. Fish and Wildlife Service
New Jersey Field Office
Ecological Services
927 North Main Street, Building D
Pleasantville, New Jersey 08232

SUBJECT: DOE and USACE Request for Re-Initiation of the Section 7 Endangered Species Act Informal Consultation for Fishermen's Atlantic City Windfarm, LLC

Dear Mr. Schrading:

The U.S. Department of Energy (DOE) is proposing to provide funding to Fishermen's Atlantic City Windfarm, LLC (project proponent) to support the development of an offshore wind renewable energy facility (proposed project) within New Jersey state waters, located approximately 2.8 miles off the New Jersey coast from Atlantic City. The U.S. Army Corps of Engineers, Philadelphia District (USACE) has regulatory and permitting authority for this proposed project under Section 404 of the *Clean Water Act* and Section 10 of the *Rivers and Harbors Act of 1899*. The USACE issued Department of the Army Permit CENAP-OP-R-2008-0777-39 for this proposed project on June 14, 2013. Since issuance of the USACE permit, the project plans have been refined and a permit modification package has been submitted to the USACE. The USACE is proposing to process a modification to that permit.

The proposed project would consist of the construction, operation, maintenance, and eventual decommissioning of up to six wind turbine generators that would generate a maximum of approximately 25 megawatts (MW) of electricity, a 33-kilovolt (kV) alternating current (AC) submarine cable interconnecting the turbines, a 33-kV AC submarine transmission cable (export cable), and a 33-kV AC underground cable (onshore interconnection cable) that would connect the proposed project with existing onshore infrastructure in Atlantic City, New Jersey.

The following federally listed species could potentially be impacted by the proposed project: roseate tern (*Sterna dougallii dougallii*) (endangered), piping plover (*Charadrius melodus*) (threatened), red knot (*Calidris canutus rufa*) (threatened), northern long-eared bat (*Myotis septentrionalis*) (candidate) and, seabeach amaranth (*Amaranthus pumilus*) (threatened).

The USACE previously completed consultation pursuant to section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 et seq.), with your office for permitting of the proposed project and determined that the proposed project is not likely to adversely affect any species listed as threatened or endangered under your jurisdiction. This determination was based on a biological assessment submitted during the consultation process. On April 26, 2012 your office concurred with this determination. A copy of this concurrence is attached (Enclosure 1). Since this concurrence, the following changes have occurred:

- A permit modification package has been submitted to the USACE. The USACE plans to issue a Public Notice to solicit comments and recommendations from the public concerning modification of the Department of the Army permit. The USACE will include your office on the distribution list to be notified when the Public Notice is published.
- The red knot has been listed as threatened and the northern long-eared bat has been listed as a candidate species under the ESA.
- DOE is completing an Environmental Assessment (EA) for the proposed project under the National Environmental Policy Act (NEPA) and the USACE is a cooperating agency. DOE will include your office on the distribution list to be notified when the draft EA is posted for the public comment period.

To streamline the NEPA process and to avoid redundancy, DOE and USACE have decided to jointly re-initiate Section 7 consultation for the proposed project. An *Addendum to the 2009 Avian Risk Assessment for the Fishermen's Energy Wind Project, Atlantic County, New Jersey: Impacts of Rotor Diameter Change to Listed Red Knots and Other Birds* is attached for your use (Enclosure 2). Also attached is *An Evaluation of the Potential for Impact to the Northern Long-Eatred Bat (Myotis septentrionalis)* (Enclosure 3). Both assessments address the modifications to the proposed project that have occurred since the completion of the initial USACE led Section 7 consultation and the potential effects of the proposed project modifications on the listed species.

DOE, as the lead federal agency and USACE, as the permitting agency, have reviewed the proposed project changes and the two assessments and determined that their respective actions of funding and modifying the permit for the proposed project *may affect but is not likely to adversely affect* the following listed species: roseate tern (*Sterna dougallii dougallii*) (endangered), piping plover (*Charadrius melodus*) (threatened), red knot (*Calidris canutus rufa*) (threatened), northern long-eared bat (*Myotis septentrionalis*) (candidate) and, seabeach amaranth (*Amaranthus pumilus*) (threatened) with the inclusion of the Department of the Army special permit conditions 29-33 (Enclosure 4).

DOE and USACE respectfully request your concurrence with their determination. Please send any correspondence to:

U.S. Department of Energy
Golden Field Office
Attn: Ms. Lori Gray
NEPA Division Director
15013 Denver West Parkway
Golden, CO 80401

U.S. Army Corps of Engineers
Regulatory Branch, Philadelphia District
Attn: Mr. Lawrence M. Slavitter
Wanamaker Building
100 Penn Square East
Philadelphia, PA 19107-3390

If you have any questions or require any additional information, please contact me at (720)356-1568 or lori.gray@ee.doe.gov or Larry Slavitter, USACE at 215-655-6734 or Lawrence.M.Slavitter@usace.army.mil.

Sincerely,

Lori Gray

Lori Gray
NEPA Division Director

Enclosures: as stated

Electronic cc:
Wendy Walsh, NJFO
Carlo Popolizio, NJFO
Lori Gray, DOE
Michael Hahn, DOE
Roak Parker, DOE
Lawrence M Slavitter, USACE

From: Knutson, Lingard
To: Gray, Lori
Subject: FW: General Conformity Analysis for Fishermen"s Atlantic city Windfarm LLC
Date: Friday, March 06, 2015 12:07:02 PM

Lori – I just forgot to put you on the to: line. Sorry!!!

Lingard

From: Knutson, Lingard
Sent: Friday, March 06, 2015 2:05 PM
To: 'Slavitter, Lawrence M NAP'
Subject: General Conformity Analysis for Fishermen's Atlantic city Windfarm LLC

Larry,

EPA's Mobile Source Team has reviewed the General Conformity Applicability Determination for the above project. EPA concurs with the report's findings, that projected emissions from the construction of the wind farm will not exceed General Conformity applicability thresholds for Nox, VOC and PM 2.5.

Lingard Knutson
Sr. Transportation and Energy Environmental Analyst
U.S. Environmental Protection Agency, Region 2
290 Broadway, 25th Floor
New York, NY
(212) 637-3747

Delaware Tribe Historic Preservation Representatives
Department of Anthropology
Gladfelter Hall
Temple University
1115 W. Polett Walk
Philadelphia, PA 19122
temple@delawaretribe.org

March 10, 2015

Department of Energy
Attn: Lori Gray and Nicole Minnichbach
Golden Field Office
15013 Denver West Parkway
Golden, Colorado 80401

Re: Fishermen's Atlantic City Windfarm, LLC

Dear Lori Gray and Nicole Minnichbach,

Thank you for notifying the Delaware Tribe of the plans for the above referenced project. Our review indicates that there are no religious or culturally significant sites within the selected project area and we have no objection to the proposed project. We defer further comment to your office.

We ask that if any archaeological remains (artifacts, subsurface features, etc.) are discovered during the construction process that construction be halted until an archaeologist can view and assess the finds. Furthermore, we ask that if any human remains are accidentally unearthed during the course of the project that you cease development immediately and inform the Delaware Tribe of Indians of the inadvertent discovery. If you have any questions, feel free to contact this office by phone at (609) 220-1047 or by e-mail at temple@delawaretribe.org.

Sincerely,

Blair Fink

Blair Fink
Delaware Tribe Historic Preservation Representatives
Department of Anthropology
Gladfelter Hall
Temple University
1115 W. Polett Walk
Philadelphia, PA 19122

State of New Jersey

MAIL CODE 501-04B
DEPARTMENT OF ENVIRONMENTAL PROTECTION
NATURAL & HISTORIC RESOURCES
HISTORIC PRESERVATION OFFICE
P.O. Box 420
Trenton, NJ 08625-0420
TEL. (609) 984-0176 FAX (609) 984-0578

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

April 1, 2015

Timothy Meeks
Acting Director
Department of Energy
Golden Field Office
15013 Denver West Parkway
Golden, Colorado 80401

Dear Mr. Meeks:

As Deputy State Historic Preservation Officer for New Jersey, in accordance with 36 CFR Part 800: Protection of Historic Properties, as published in the *Federal Register* on December 12, 2000 (65 FR 77725-77739) and amended on July 6, 2004 (69 FR 40544-40555), I am providing Consultation Comments for the following proposed undertaking:

Atlantic County, Atlantic City
Proposed Construction of Six Wind Turbine Generators
Fisherman's Atlantic City Windfarm, LLC
United States Department of Energy

Thank you for providing the Historic Preservation Office (HPO) with the opportunity to review and comment on the potential for the above-referenced undertaking to affect historic properties. It is the understanding of the HPO that Section 106 consultation is being reinitiated as a result of project changes since the original issuance of a 2013 United States Department of the Army, Corps of Engineers (Corps) permit as well as the necessity for the Department of Energy (DOE) to prepare an Environmental Assessment pursuant to the National Environmental Policy Act.

Previous consultation was conducted between the HPO and the Corps regarding the issuance of the 2013 Corps permit CENAP-OP-R-2008-0777-39. At that time the HPO concurred with the Corps' determination that no historic properties would be affected by the proposed undertaking. Please note however, review of the 2013 Army Corp permit was limited solely to direct physical effects through the Corps' application of Appendix C of 33 CFR Part 325. As a result, indirect visual effects were not considered during the HPO's previous review. The following consultation comments are in response to the additional information received from the DOE on February 20, 2015 for the above-referenced undertaking.

800.4 Identification of Historic Properties

Based on the information provided, the following twelve historic properties were identified within the project's area of potential effects (APE):

1. The John Stafford Historic District (listed on the National Register of Historic Places on June 9, 1988);
2. The Raphael-Gordon House (determined eligible for listing on the New Jersey and National Registers of Historic Places on April 11, 1997);
3. The Strand and Marine Apartments (determined eligible for listing on the New Jersey and National Registers of Historic Places on July 30, 2008);
4. The Atlantic City Convention Hall (designated a National Historic Landmark on February 27, 1987);
5. The Warner Theater [façade] (determined eligible for listing on the New Jersey and National Registers of Historic Places on January 9, 1996);
6. The Absecon Lighthouse (listed on the National Register of Historic Places on January 25, 1971);
7. The Shelburne Hotel [demolished] (listed on the National Register of Historic Places on May 19, 1978);
8. The Holmhurst Hotel [demolished]] (listed on the National Register of Historic Places January 12, 1978);
9. The Morton Hotel [demolished] listed on the National Register of Historic Places July 15, 1977);
10. The Church of the Redeemer determined eligible for listing on the New Jersey and National Registers of Historic Places on March 10, 1997);
11. The Great Egg Coast Guard Station Building (listed on the National Register of Historic Places October 31, 2005);
12. Lucy, The Margate Elephant (designated a National Historic Landmark on May 11, 1976).

800.5 Assessment if Adverse Effects

Historic Architecture

According to the information provided, a viewshed analysis report was completed for the proposed undertaking and is included with the DOE consultation. Of the twelve historic properties identified for this undertaking, three were determined to have been previously demolished (the Shelburne Hotel, the Holmhurst Hotel, and the Morton Hotel). As a result, a viewshed analysis was conducted for the nine remaining historic properties. This analysis included the acquisition of photographs taken from the vantage point of the historic property and the subsequent digital rendering of the proposed turbines within these images. Based on the results of the viewshed analysis it was determined that the proposed turbines will only be visible from six of the identified historic properties between Ventnor and Atlantic Cities. The documentation states that in all of these locations the turbines on the horizon will appear as structures that will be much smaller in comparison to surrounding structures and therefore will not diminish the integrity of any of the identified historic properties. In light of this analysis, it is the DOE's determination there are no historic properties affected by the proposed undertaking. *The HPO does not concur with this determination based on the information provided.*

The HPO has reviewed the information provided and has specific concerns regarding the criteria and metrics utilized to undertake the viewshed analysis. Specifically, the HPO has the following concerns:

- The viewshed analysis does not include information detailing how the visual APE for the undertaking was defined beyond simply that sites were chosen "due to their close proximity to the ocean (within 500 feet) or their public appeal and vantage point of the shore area." (AMEC 2010:6) This definition does not include the potential geographic extent in which the wind turbines may be visible along the coast and to inland locations. As a result, the HPO cannot concur that the APE has been appropriately defined and that all potential historic properties that may be affected by the proposed undertaking have been identified. The HPO requests that the viewshed analysis be revised to fully define the geographic extent of the APE as well as define the metrics that were utilized to represent the wind turbines within the viewpoints that were analyzed.
- The viewshed analysis states that a viewpoint was not obtained from the howdah of the National Historic Landmark Lucy, The Margate Elephant because it was closed at the time of survey. Only ground level viewpoints were collected. The report concludes that views of the turbines from the bottom of the structure will be completely shielded by the landscape and other tall structures. Additionally, the report states that it was determined that the turbines will "most likely" not be visible from the top of Lucy, the Margate Elephant. However, a preliminary analysis by the HPO of the location data provided indicates that at a minimum, Lucy has a direct line-of-sight to wind turbine 1, with a viewshed of roughly 7 miles to the horizon line, making at least this turbine clearly visible. The HPO requests that the viewshed analysis be revised to include a review from the top of the National Historic Landmark Lucy, The Margate Elephant.
- The viewshed analysis documents the potential appearance of the six proposed wind turbine off of the Atlantic City coast. The HPO has reviewed viewshed analyses for similar projects, including those completed for the Bureau of Ocean Energy Management's Cape Wind project and has concerns that the renderings presented do not adequately represent the scale and massing of the proposed turbines. Other projects reviewed have demonstrated a greater visual impact of turbines at a greater distance than the ones represented in the current undertaking. In addition, HPO observances of existing turbines in New Jersey at the proposed distance demonstrate a similar greater representation. The HPO requests clarification regarding the metrics used to develop the renderings in the submitted viewshed analysis.

In addition to the viewshed analysis, the HPO has a concern with the DOE's conclusion that "the turbines on the horizon will appear as structures that will be much smaller in comparison to surrounding structures and therefore will not diminish the integrity of any of the identified historic properties." What surrounding structures are the DOE referring to? As it currently exists, there are no permanent standing structures of the size and scope of the proposed wind turbines in the waters of New Jersey in the vicinity of Atlantic City. The HPO requests clarification of this statement. As currently proposed, the introduction of the six wind turbines will represent an interruption of the natural horizon line and will alter the historic character, setting, and viewshed from the New Jersey coastline within the APE.

Without the above-referenced information the HPO cannot properly evaluate the current determination. Once the above-referenced information is received for review and comment, then the HPO will be able to appropriately review the determination made by the DOE. The HPO looks forward to further consultation with the DOE regarding the identification and evaluation of historic properties within the undertakings APE, pursuant to Section 106 of the National Historic Preservation Act, as amended.

Archaeology

The HPO previously has the opportunity to review and comment on the identification of historic properties within the APE for direct effects. At the time, the HPO concurred with the assessment that there were no historic properties present within the APE for the proposed construction of the turbines and associated. *The HPO still concurs with this assessment.*

Additional Comments

Due to the presence of the National Historic Landmark Lucy, The Margate Elephant within the undertaking's defined APE, the HPO recommends the inclusion of the following consulting party for the purposes of Section 106 consultation:

Richard Helfant
Executive Director / C.E.O.
Lucy the Elephant
9200 Atlantic Avenue
Margate, New Jersey 08402-2449

Thank you for providing the opportunity to review and comment on the potential for the above-referenced project to affect historic properties. The HPO looks forward to receiving the requested information. Please reference the HPO project number 08-0485, in any future calls, emails, or written correspondence to help expedite your review and response. Please do not hesitate to contact Jesse West-Rosenthal (609-984-6019) of my staff with questions regarding archaeology.

Sincerely,

Daniel D. Saunders
Deputy State Historic
Preservation Officer

Cc: Nicole Minnichbach - USACE
Janet Stewart – NJDEP, DLUR
Richard Helfant – Lucy

DDS/KJM/JWR

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New Jersey Field Office
927 North Main Street, Building D
Pleasantville, New Jersey 08232
Tel: 609-646-9310 Fax: 609-646-0352
http://www.fws.gov/northeast/njfieldoffice

IN REPLY REFER TO:
2010-CPA-0267 (2010-I-0416)

APR 10 2015

Lori Gray, NEPA Division Director
Department of Energy, Golden Field Office
15013 Denver West Parkway
Golden, Colorado 80401
Email: Lori.Gray@ee.doe.gov (cc: Lawrence.M.Slavitter@usace.army.mil)

Reference: Re-initiation of Section 7 consultation for Fishermen's Atlantic City Windfarm, LLC

The U.S. Fish and Wildlife Service (Service) has reviewed the above-referenced proposed project pursuant to the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*) (ESA) to ensure the protection of federally listed endangered and threatened species. The following comments do not address all Service concerns for fish and wildlife resources and do not preclude separate review and comment by the Service as afforded by other applicable environmental legislation. A known occurrence or potential habitat for the following federally listed or candidate species is located on or near the project's impact area. However, the Service concurs that the proposed project is not likely to adversely affect federally listed or candidate species for the reasons listed below.

Species	**Basis for Determination**
piping plover (*Charadrius melodus*), threatened red knot (*Calidris canutus rufa*), threatened roseate tern (*Sterna dougallii dougallii*), endangered	Your February 23, 2015 letter and March 31, 2015 email confirm that U.S. Army Corps of Engineers permit conditions relative to these species will remain unchanged. These permit conditions are consistent with the conservation measures listed in our April 26, 2012 concurrence letter. None of the project changes noted in your February 23, 2015 letter (or the enclosed Avian Addendum) appreciably increase the risk of adverse effects to these species (*e.g.*, project changes do not increase turbine collision risks).
northern long-eared bat (*Myotis septentrionalis*), threatened	According to your March 31, 2015 email, there will be no tree clearing as part of the project. Although small numbers of bats have been documented offshore of New Jersey, offshore areas lack suitable habitat and are not considered a significant migratory pathway for these species; thus, we concur that collision risk for the northern long-eared bat is discountable.
seabeach amaranth (*Amaranthus pumilus*), threatened	Your March 31, 2015 email states that the permit condition for this species will be revised as follows, "If installation or maintenance work is required, between May 15 and November 30 of any year, that would disturb any beach/dune areas landward of mean high water, a survey of the beach/dune area for the presence of Sea beach Amaranth shall be performed no more than 1 week before the start of work, and the results sent to the Corps of Engineers and the US Fish and Wildlife Service for review. No work shall be performed in beach/dune areas until written approval is received by the permittee from this office."

Except for the above-mentioned species, no other federally listed or proposed threatened or endangered flora or fauna under Service jurisdiction are known to occur within the proposed project's impact area. Therefore, no further consultation pursuant to the ESA is required. If additional information on federally listed species becomes available, or if project plans change, this determination may be reconsidered. Please refer to this office's web site at http://www.fws.gov/northeast/njfieldoffice/Endangered/ for further information including federally listed and candidate species lists, procedures for requesting ESA review, the National Bald Eagle Management Guidelines, and contacts for obtaining information from the New Jersey Natural Heritage and Endangered and Nongame Species Programs regarding State-listed and other species of concern.

Reviewing Biologist: Wendy Walsh
Wendy Walsh

Authorizing Supervisor:
Eric Schrading

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
55 Great Republic Drive
Gloucester, MA 01930-2276

MAY 1 1 2015

Timothy Meeks, Acting Director
Department of Energy
Golden Field Office
15013 Denver West Parkway
Golden, Colorado 80401

RE: Fishermen's Energy Off-Shore Wind Project

Dear Mr. Meeks,

In May 2012, we completed informal consultation, pursuant to section 7 of the Endangered Species Act (ESA) of 1973, as amended, with the U.S. Army Corps of Engineers (USACE) regarding the Fishermen's Energy wind energy project. In a February 9, 2015 letter, you requested reinitiation of that consultation to consider changes in the proposed action. The Department of Energy (DOE) is providing funding for the project and is now the lead Federal agency for the section 7 consultation. You have determined that effects of the modified project are not likely to adversely affect any ESA listed species under our jurisdiction. We have reviewed the materials sent with your February 2015 letter in addition to the noise calculations provided on March 27, 2015, and have determined that reinitiation of consultation is not necessary.

Re-initiation of consultation is required where discretionary federal involvement or control over the action has been retained or is authorized by law and: (a) the amount or extent of taking specified in the incidental take statement is exceeded; (b) new information reveals effects of the action that may not have been previously considered; (c) the identified action is subsequently modified in a manner that causes an effect to listed species; or (d) a new species is listed or critical habitat designated that may be affected by the identified action.

Your letter states that the listing of five distinct population segments (DPS) of Atlantic sturgeon occurred after our May 2012 letter of concurrence (LOC). However, the listing was completed prior to the completion of our LOC and our LOC considered effects of the proposed action on all five DPSs of Atlantic sturgeon. Since the May 2012 LOC, no new species have been listed or critical habitat designated that may be affected by the proposed action. The proposed action has not yet commenced; therefore, there has been no opportunity for take to occur and exceed the amount specified in the Incidental Take Statement. There is no new information that effects of the action may affect listed species in a manner or to an extent not considered in the 2012 LOC. We have determined the changes to the proposed action will not cause an effect to listed species not considered in the 2012 LOC; therefore, the "not likely to adversely affect" determination is valid for the modified project. Our supporting analysis is presented below.

Changes to the Proposed Action

A description of the proposed action was included in our May 2012 LOC. We incorporate that description by reference. With the exception of what is described below, the proposed action remains as described in the 2012 LOC. The proposed changes include: increased generating capacity of each turbine from 3.6 megawatts (MW) to 5 MW; increasing the electric cable array capacity from 20 MW to 25 MW; decreased transmission line capacity from 34.5 kilovolt (kV) to 33 kV; and a number of above the water line changes to the tower or turbine to accommodate these changes. Additionally, rock scour mats are no longer proposed for use. The decommissioning plan has been updated to remove references to removal of rock scour mats. Changes to the transmission line include a narrower diameter cable (5" diameter rather than 8" diameter) and a shallower installation depth (6 feet below the surface instead of 9 feet below the surface). The only other in-water change to the project is modifying the turbine support structures from a total of 18 52"-diameter piles to 24 84"-diameter piles.

The new foundation design will consist of four 84" piles driven to a depth of approximately 150 feet below the mudline. Piles will be installed with an impact hammer. The maximum sound generation for each piles would be approximately 199 dB re 1uPa at 10 meters from the source (peak; 185 dB re 1uPa RMS), with frequencies ranging between 10 Hz and 2 kHz. Using the practical spreading loss model, which is appropriate for an open water system such as the ocean area where the piles will be installed, the applicant indicates that noise will attenuate to 180 dB re 1uPa RMS at approximately 25 m and 160 dB re 1uPa RMS at 600 m from the source. Noise will attenuate to below 150 dB re 1uPa RMS at 3,400 m from the pile being driven. In our 2012 LOC, we considered that noise would attenuate to 180 dB re 1uPa RMS at approximately 15 m; 160 dB re 1uPa RMS at 500 m; and attenuate to below 150 dB re 1uPa RMS at 3,800 m from the pile being driven. Each pile will take 2-3 hours to install. All pile driving is expected to occur over a 30 day period in May-June, 2017.

Effects of the Proposed changes on ESA listed species

A number of above the water line changes to the tower or turbine are proposed to accommodate the change in generating capacity. These revisions will have no effect to ESA-listed species because they involve changes to the project above the water where these species do not occur and their effects do not extend into the marine environment. Therefore, these revisions are not further assessed in this document.

Transmission line

The installation method for the transmission line (jet plow and horizontal directional drilling) has not changed. The cable to be installed will have a narrower diameter and will not be installed as deeply under the ocean bottom. In the 2012 LOC, we considered effects of installation of the cable via jetplow. We analyzed the potential for interactions with the cable laying equipment as well as the effects of destruction of prey, loss of benthic resources, turbidity and suspended sediments. We concluded that all effects of cable installation to listed whales, sea turtles and Atlantic sturgeon would be insignificant and discountable. The reduction in cable diameter and reduction in burial depth does not introduce any new effects that were not considered in the 2012 LOC. As determined in the 2012 LOC, effects would be insignificant and discountable.

Changes to Turbine Support

The possible acoustic effects of pile driving during project construction on ESA listed whales, sea turtles and Atlantic sturgeon were considered in the 2012 LOC. Effects of pile installation considered in the LOC included acoustics (potential for injury and behavioral disturbance), water quality (turbidity) and impacts to benthic resources and habitat. The revised project design calls for more piles of a larger diameter. The installation method remains the same.

The species that whales forage on (copepods, krill, small schooling fish) are not expected to be affected by disturbances to the benthic environment, no foraging whales will be affected by the proposed action. The alteration of benthic habitat and the loss of benthic resources resulting from the installation of turbine support piles could impact sea turtles and Atlantic sturgeon. While there is likely to be some loss of sea turtle and Atlantic sturgeon forage items, the amount of habitat affected represents a very small percentage of the available foraging habitat for these species. Any shift in foraging is likely to be only to undisturbed areas only a few feet away. As only a small percentage of the potential foraging areas in the action area will be affected, any movements of sea turtles or Atlantic sturgeon to other foraging sites are likely to be localized and the benthic disturbance is not likely to cause sea turtles to leave the action area. Recolonization of temporarily disturbed areas is expected to be rapid, with colonization by mobile organisms beginning within days and complete recolonization occurring within 3-12 months. Permanent loss of benthic resources will be limited to the footprints of the turbine support piles (total of approximately 0.085 acres). Because the amount of habitat lost is so small, the loss of this habitat is not likely to have any effects that can be meaningfully measured or detected. As such, any effects to these species resulting from loss of benthic habitat resulting from the installation of piles will be insignificant.

In the 2012 LOC, we considered the effects of increased turbidity on whales, sea turtles and Atlantic sturgeon during pile installation. The installation of six additional piles will result in six additional events where turbidity will be increased. However, as explained in the 2012 LOC, the increase in turbidity will be small and short term, settling out within only a few hours. It is extremely unlikely that the installation of piles will result in a turbidity plume that causes any effects to listed species in the action area. As such, effects are discountable.

Effects of Noise Exposure

Here we consider further the acoustic effects of the proposed changes to pile installation. As explained in the 2012 LOC, we considered the potential for injury to listed whales if exposed to underwater noise louder than 180 dB re 1uPa RMS and the potential for a behavioral response to impulsive noise of 160 dB re 1uPa RMS or louder and continuous noise of 120 dB re 1uPa RMS or louder. The 120 dB re 1uPa RMS criteria is not relevant here as pile driving is an impulsive, and not continuous, noise source. For sea turtles, we do not anticipate any potential for injury upon exposure to noise less than 180 dB re 1uPa RMS and do not expect any behavioral response to noise less than 166 dB re 1uPa RMS. For Atlantic sturgeon, we will consider the potential for physiological effects upon exposure to impulsive noise of 206 dB_{Peak} and 187 dB re 1uPa^2-s cSEL. Use of the 183 dB re 1uPa^2-s cSEL threshold is not appropriate for this consultation because all Atlantic sturgeon in the action area will be larger than 2 grams.

The applicant has provided additional information on March 27, 2015 for the increased number and size of piles to be used (see Table 1 below).

Table 1: Sound source levels for pile driving to be conducted during Fisherman's Energy Offshore Wind Project construction operations (provided by DOE)

Noise Level	Distance from Source (m)
199 dB re 1uPa PEAK	10
180 dB re 1uPa RMS	25
160 dB re 1uPa RMS	600
150 dB re 1uPa RMS	3,400
187 dB re 1uPa^2-s cSEL (4,500 strikes)	371

As noted in the special project conditions, an initial exclusion zone around the pile driving equipment of 1,200 meters will be established such that piles will not be driven if a whale or sea turtle is observed within 1,200 meters of the pile to be driven. Acoustic monitoring during the installation of the first pile will take place. Since multiple piles are being driven, the applicant can then either maintain the 1,200 km exclusion zone or reset it to a distance where underwater noise will be less than 160dB re 1uPa RMS outside the zone.

Whales

Large whales may experience injury upon exposure to noise of 180 dB re 1uPa RMS or louder. In the 2012 LOC, we considered the effects of pile driving with the 180 dB re 1uPa RMS isopleth extending approximately 15 m from the pile being driven and determined that it was extremely unlikely that any listed whales would be exposed to injurious levels of noise during pile driving. With the larger piles, the 180 dB re 1uPa RMS isopleth will extend only 25 m from the pile being driven. In the 2012 LOC, we considered that the 160 dB re 1uPa RMS isopleth would extend up to 500 m from the pile being driven. With the larger piles, the 160 dB re 1uPa RMS isopleth will extend 600 m from the pile being driven. In the 2012 LOC, we state that maintenance of the 1,200 m monitored exclusion zone will ensure that no whales will be exposed to potentially injurious or disturbing levels of underwater noise. This is because the potential for exposure to injurious or disturbing levels of noise only exists within that exclusion zone. With the larger piles, the area where injurious and disturbing levels of noise may be experienced is larger (extending 25 m from the pile rather than 15 m from the pile and extending 600 m from the pile instead of 500 m, respectively); however, it is contained within the exclusion zone. Therefore, our conclusion that whales will not be exposed to injurious levels of noise remains valid.

It is reasonable to expect that the observer will be able to spot any whale that is within 1,200 meter exclusion zone. The observer will monitor the exclusion zone for 60 minutes prior to pile driving commencing. Right whales have a maximum dive time of 40 minutes. Because the monitoring period is longer than the maximum dive time, any whale submerged within the exclusion zone would need to come to the surface during the pre-driving monitoring period. We expect an observer would detect either the body of the whale, which is large, or the distinctive blow produced several feet above the water surface when the whale takes a breath. Because pile driving will not occur if conditions are such that the observer cannot adequately monitor the entirety of the exclusion zone, pile driving will not occur when sea surface or weather conditions are such that an observer would not be able to detect a whale in the exclusion zone. As an exclusion zone with a radius of 1,200 m will be maintained (i.e., no pile driving will occur if a whale is within 1,200 m of the pile being driven) and the extent of the area with potentially injurious levels of noise extends no more than 25 m and the extent of the area with potentially disturbing levels of noise extends no more than 600 m, it is extremely unlikely any listed whales will be exposed to injurious or disturbing levels of noise during pile driving. Therefore, our determination that whales are not likely to be adversely affected by noise produced during pile driving remains valid.

Sea Turtles

The maintenance of the 1,200 m exclusion zone will ensure no sea turtles would be exposed to potentially injurious or disturbing levels of underwater noise (expected to be experienced within 25 and 600 m of the pile being driven, respectively). As explained in the 2012 LOC, the normal duration of sea turtle dives ranges from 5-40 minutes depending on species (Spotila 2004). As sea turtles typically surface more frequently than every 60 minutes, it is reasonable to expect that monitoring the exclusion zone for at least 60 minutes will allow the endangered species observer to detect any sea turtles that may be submerged in that area. As an exclusion zone with a radius of 1,200 m will be maintained (i.e., no pile driving will occur if a sea turtle is within 1,200 m of the pile being driven) and the extent of the area with potentially injurious levels of noise extends no more than 25 m and the extent of the area with potentially disturbing levels of noise extends no more than 600 m, it is extremely unlikely any sea turtles will be exposed to injurious or disturbing levels of noise during pile driving. Therefore, our determination that sea turtles are not likely to be adversely affected by noise produced during pile driving remains valid.

Atlantic sturgeon

In the 2012 LOC, we considered effects to sturgeon based on the peak noise criteria (206 dB re 1uPa) and the 150 dB re 1uPa RMS behavioral criteria. As noted in the 2012 LOC, the Fisheries Hydroacoustics Working Group recommends a dual criteria (peak and cSEL) when assessing effects of pile driving noise on Atlantic sturgeon. Here, we consider the dual injury criteria and the behavioral threshold.

Information provided to us on March 27, 2015, indicates that peak noise generated from the pile installation will be less than the values expected to result in injury or mortality of Atlantic sturgeon (i.e., it is less than 206dB re 1uPa Peak). In addition to the "peak" exposure criteria, which relates to the energy received from a single pile strike, the potential for injury exists for multiple exposures to lesser noise. That is, even if an individual fish is far enough from the source to not be injured during a single pile strike, the potential exists for the fish to be exposed to enough smaller-impact strikes to result in physiological impacts. The cSEL criterion is used to measure such cumulative impacts. The cSEL is not an instantaneous maximum noise level, but is a measure of the accumulated energy over a specific period of time (e.g., the period of time it takes to install a specific structure, such as a pile). For the proposed action, it will take 2-3 hours to install each pile, with only one pile being driven per day. The cSEL is calculated by incorporating both the noise level associated with a single strike of the pile as well as the total number of pile strikes. Because the cSEL accounts for all of the strikes necessary to install a pile, we must consider if it is reasonably likely that a sturgeon will be exposed not to a single pile strike but the number of pile strikes used for the calculation. In this case, because it will take 2-3 hours of driving to install each pile, a sturgeon would only be exposed to noise at 187 dB re 1uPa 2s cSEL if it remained within 371 m of the pile being installed for the entire duration of pile driving. It is extremely unlikely that a sturgeon would remain within this distance of the pile being driven for the entire pile driving period. A soft start will be undertaken prior to the initiation of pile driving at full energy, and thus, will result in underwater noise levels (150 dB_{RMS}) that will result in the movement of Atlantic sturgeon away from the pile being installed. As each strike of the pile intensifies, the extent at which disturbing levels of noise would be experienced will also increase. Thus, sturgeon that left the area during the initiation of pile driving will continue to divert their movements away from the sound source as pile driving operations continue and the area of behaviorally disturbing levels of noise increases. As a result, any sturgeon that may have been present at the onset of pile driving operations is not expected to be found within 371m of the pile, and thus, are not expected to remain within the area long enough to accumulate injurious pressure levels.

Once a sturgeon is further than 371 m from the pile there is no potential for exposure to injurious levels of sound. We expect sturgeon to start swimming away from the pile as soon as pile driving begins. We have considered whether a sturgeon is likely to be able to swim far enough away from the pile being installed in time to avoid exposure to the full duration of pile installation. In order to avoid being exposed to injurious levels of noise, a sturgeon adjacent to a pile at the onset of installation would need to swim 371 m before the end of a 2 hour pile driving time, requiring a swim speed of approximately 0.186 km/hour (5.16 cm/s or 0.17 ft/s).

Swimming speeds of fish are generally classified as sustained, prolonged, or burst. Sustained speeds are low and those which the fish can maintain for long periods (i.e., >200 min). They depend on aerobic metabolism, do not result in muscular fatigue, and are used in foraging and other routine activities. Prolonged speeds are moderate, of intermediate duration (i.e., 0.5–200 min), and use aerobic and anaerobic metabolism. Burst speeds are the highest attainable speeds, but can only be maintained for short periods (i.e., <0.5 min) due to accumulation of anaerobic metabolites and muscular fatigue (Peake 2004 in LeBreton *et al.* 2004). Higher prolonged and burst speeds are used in prey capture, short-term movements in fast current, and predator avoidance and, consequently, can be used to characterize 'escape' speeds. We would expect sturgeon swimming away from a loud noise (such as a pile being installed with an impact hammer) to start out at "burst" or "escape" speed and then slow down to "prolonged" or "sustained" speed when its burst speed duration had been exceeded. Maximum swim speed for sturgeon can be described as a linear function of fish length; given that, larger fish are expected to be capable of swimming faster than smaller fish (Peake 2004). Any sturgeon in the action area are expected to be at least 76 cm (the expected minimum size of Atlantic sturgeon migrating outside of their natal estuary; ASSRT 2007). Given the morphological similarities between all sturgeon species, it is reasonable to use other sturgeon species as a surrogate for establishing swim speed of Atlantic sturgeon.

A study examining daily non-migratory movements of subadult and adult green sturgeon (101-153 cm TL) in San Francisco Bay (Kelly and Klimley 2011) reports an average swimming speed of 0.5-0.6 meters/second (1.6-2 fps) with a maximum recorded speed of 2.1 meters/second (7 fps). Reported burst (also called critical or maximum) swim speeds of subadult and adult shovelnose, lake, and green sturgeon range from 60-116 cm/s (1.9-3.8 fps) (Cheong *et al.* 2006). Sustained swim speeds of adult lake sturgeon were reported as 83.7 cm/s (2.74 fps) (Cheong *et al.* 2006).

Hoover *et al.* (2011) demonstrated the swimming performance of juvenile lake sturgeon and pallid sturgeon (12 – 17.3 cm FL) in laboratory evaluations. The authors compared swimming behaviors and abilities in water velocities ranging from 10 to 90 cm/second (0.33-3.0 fps). They report burst swim speeds of 40-70cm/s (1.3-2.3 fps), prolonged swimming at 15-70cm/s (0.5-1.5 fps) and sustained swimming at speeds of 10-45 cm/s (0.3-1.5 fps). Boysen and Hoover (2009) assessed the probability of entrainment of juvenile white sturgeon by evaluating swimming performance of young of the year fish (8-10 cm TL). The authors report escape speeds of 40-45 cm/s. Kieffer *et al.* (2009) reports maximum swim speeds of juvenile shortnose sturgeon (14-18cm) as 3.4 cm/s (or 2.18 body lengths/second). Clarke (2011) reports on swim tunnel performance tests conducted on juvenile and subadult Atlantic, white and lake sturgeon. He concludes that burst swim speed is approximately 65 cm/s (2.1 fps) and prolonged swim speed is 45 cm/s (1.5 fps). We expect the Atlantic sturgeon in the action area to have greater swim speeds than the juveniles studied due to their significantly larger size.

Assuming that the sturgeon in the action area have a swimming ability at least equal to those subadults reported in studies summarized above, we expect all Atlantic sturgeon in the action area to have a prolonged swim speed of at least 1.5 fps (45 cm/s) and an escape or burst speed of at least 2.1 fps (64 cm/s). Sturgeon are expected to be able sustain their prolonged swim speed for up to 200 minutes without muscle fatigue and their sustained swim speed for periods longer than 200 minutes. To move away from a pile being installed in sufficient time to avoid accumulating enough energy to result in injury, a sturgeon would need to be swimming at 0.17 fps for a maximum period of 2 hours. This is far less than the minimum prolonged swim speed reported for subadult sturgeon (1.5 fps). At a prolonged swim speed of 1.5 fps, a sturgeon would be able to swim outside the area where potentially injurious levels of noise could be experienced (371 m) in about 20 minutes. Therefore, we expect all sturgeon in the action area to be able to readily swim away from the ensonified area at a normal sustained swim speed in time to avoid injury. Based on this analysis, we do not expect any Atlantic sturgeon to be exposed to noise resulting from impact pile driving that could result in physiological effects including injury or mortality.

In the 2012 LOC, we considered effects to Atlantic sturgeon from exposure to noise above 150 dB re 1uPa RMS. Modeling provided at that time indicated that the 150 dB re 1uPa RMS isopleth would extend up to 3,800 m from the pile. For the proposed modifications of piles being used, the area where noise levels will be above the level that could result in behavioral modifications was estimated to extend 3,400 meters from the pile being driven. These revised values were provided to us by DOE and were calculated using the practical spreading loss equation, with a transmission loss constant of 15. This is an appropriate calculation methodology given the open ocean environment where piles will be installed. As described in the 2012 LOC, Atlantic sturgeon are expected to react behaviorally to underwater noise levels of 150 dB re 1uPa RMS by demonstrating avoidance behaviors. Underwater noise levels of

150dB$_{RMS}$ will extend a maximum of 1,848 m from the pile being driven. Any sturgeon within 1,848 m of the pile being driven are expected to swim away from the noise until they are outside the area where noise is louder than 150dB re 1uPa RMS. Any sturgeon outside of the area where noise is louder than 150 dB RMS would avoid the area with elevated noise until the pile driving stops. As noted above, pile driving will occur for no more than 3 hours per day.

As explained in the 2012 LOC, the effect of avoiding this area for up to a 3-hour period is expected to be insignificant given that if the area is used at all it would only be used for occasional transient movements between other areas. Avoiding the ensonified area would not result in any negative impacts to any Atlantic sturgeon. Sturgeon that make evasive movements to avoid the area with disturbing levels of noise may experience increased energy expenditure and a delay of resting and foraging. However, due to the temporary nature of the disturbance (i.e., 3 hours a day), and the transient nature of any individuals in the action area, an individual Atlantic sturgeon would only experience this disturbance once. Because a sturgeon will be able to "escape" from the noisy area at normal, sustained or prolonged swim speeds, any increased metabolic cost is expected to be insignificant and will not cause any physiological stress to the fish. Based on this analysis, all effects to Atlantic sturgeon from avoidance behavior will be insignificant and/or discountable. Therefore, our determination that Atlantic sturgeon are not likely to be adversely affected by noise produced during pile driving remains valid.

Conclusions of ESA Consultation

We have reviewed the modifications to the previous action being proposed by Fishermen's Energy. All effects will be insignificant and discountable; therefore, our conclusion that the proposed action is not likely to adversely affect any listed species under our jurisdiction remains valid. Re-initiation of consultation is required and shall be requested by ACOE or by NFMS where discretionary federal involvement or control over the action has been retained or is authorized by law and (a) if new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered in the consultation; (b) if the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the consultation; or, (c) if a new species is listed or critical habitat designated that may be affected by the identified action. No take of any listed whale, sea turtle or Atlantic sturgeon is anticipated or exempted; take is defined in the ESA as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct." If there is any incidental take of a listed species, reinitiation would be required.

Coordination under the Marine Mammal Protection Act (MMPA)

An Incidental Harassment Authorization, issued under the MMPA, for the take by Level B harassment of a small number of bottlenose dolphins, harbor porpoise and harbor seals was issued by NMFS on July 6, 2012 (77 FR 39999). This authorization was effective from May 1 – August 31, 2013. Nothing in this consultation letter changes or alleviates any obligations of you or the applicant under the MMPA. If you have not done so already, we recommend you contact Jolie Harrison in NMFS' Office of Protected Resources ((301) 427-8401) to determine if a new authorization is necessary.

Ongoing Essential Fish Habitat Consultation

Coordination with our Habitat Conservation Division regarding effects to Essential Fish Habitat from the modified project is ongoing. Please contact Karen Greene with any questions regarding that coordination (Karen.Green@noaa.gov or (732)872-3023).

We look forward to continuing to work cooperatively with you and your agency on the development of alternative energy in State waters. Should you have any questions regarding this consultation, please contact Julie Crocker of my staff at (978) 282-8480 or by e-mail (Julie.Crocker@noaa.gov).

Sincerely,

Kimberly B. Damon-Randall
Assistant Regional Administrator
for Protected Resources

CC: Slavitter, ACOE
Greene - F/GAR4
Harrison, F/PR

File Code: Sec 7 DOE/ACOE NAP Fishermen's Energy 6 towers NJ
PCTS: NER-2012-1588

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APPENDIX I.

Special Permit Conditions (as required by ACOE)

Part 1.

The following mitigation, monitoring and reporting requirements shall be implemented by the permittee during the conduct of the installation of the wind turbine's jacketed foundation. Additional detail on how these measures will be implemented is described in the MMS Gulf of Mexico NTL No. 2007-G02 (see http://www.gomr.mms.gov/homepg/regulate/regs/ntls/2007NTLs/07-g02.pdf), or superseding NTL. Although this NTL focuses on seismic surveying with air guns in the GOM, the methodologies described in the NTL for exclusion-zone monitoring, ramp up and shut down as the same as those that will be required under this proposed action.

1. Establishment of Exclusion Zone: A 1250 meter (4100 feet) radius exclusion zone for listed marine mammals and sea turtles will be established around the turbine being installed in order to reduce the potential for serious injury or mortality of these species.

2. Visual Monitoring of Exclusion Zone: The exclusion zone around the turbine support vessel must be monitored for the presence of listed marine mammals or sea turtles before, during and after any pile driving activity. The exclusion zone will be monitored for 60 minutes prior to the ramp up (if applicable) of the hydraulic hammer. If the exclusion zone is obscured by fog or poor lighting conditions, work will not be initiated until the entire exclusion zone is visible for the 60 minute period. If listed marine mammals or sea turtles are observed within the zone during the 60 minute period and before the ramp up begins, pile driving will be delayed until they move out of the area and until at least an additional 30 minutes have passed without a listed marine mammal or sea turtle sighting. Monitoring of the zone will continue for 30 minutes following completion of the pile driving.

3. Monitoring of the zones will be conducted by one qualified NMFS-approved observer. Observer qualifications will include direct field experience on a marine mammal/sea turtle observation vessel and/or aerial surveys in the Atlantic Ocean. All observers will receive NMFS-approved marine mammal observer training and be approved in advance by NMFS after a review of their qualifications. Visual observations will be made using binoculars or other suitable equipment during daylight hours. Data on all observations will be recorded based on standard marine mammal observer collection data. This will include: dates and locations of construction operations; time of observation, location and weather; details of marine mammal sightings (e.g., species, numbers, behavior); and details of any observed taking (behavioral disturbances or injury/mortality). Any significant observations concerning impacts on listed marine mammals or sea turtles will be transmitted to NMFS and MMS within 48 hours. Any observed takes of listed marine mammals or sea turtles resulting in injury or mortality will be immediately reported to NMFS and US Army Corps of Engineers.

4. Implementation of Ramp-Up: A "ramp-up" (if allowable depending on specific sound source) will be required at the beginning of pile driving in order to allow marine

mammals and sea turtles to vacate the area prior to the commencement of activities. Pile driving may not commence (i.e., ramp up) at night time or when the exclusion zone cannot be effectively monitored (i.e., reduced visibility).

5. Shut Down: Continuous (day and night) pile driving operations will be allowed. However, if a listed marine mammal or sea turtle is spotted within or transiting towards the exclusion zone surrounding the turbine and the survey vessel, an immediate shutdown of the equipment will be required. Subsequent restart of the profiler will only be allowed following clearance of the exclusion zone and the implementation of ramp up procedures (if applicable).
6. Compliance with Equipment Noise Standards: All pile driving equipment will comply as much as possible with applicable equipment noise standards of the U.S. Environmental Protection Agency, and all equipment will have noise control devices no less effective than those provided on the original equipment.
7. The following reports must be submitted during the conduct of pile driving:
    a. A report will be provided to COE and NMFS within 90 days of the commencement of pile driving activities that includes a summary of the work and monitoring activities and an estimate of the number of listed marine mammals and sea turtles that were observed during pile driving activities. The report will include information, such as: dates and locations of operations, details of listed marine mammal or sea turtle sightings (dates, times, locations, activities, associated work), and estimates of the amount and nature of listed marine mammal or sea turtle takings.
    b. Any observed injury or mortality to a listed marine mammal or sea turtle must be reported to NMFS and COE within 24 hours of observation. Any significant observations concerning impacts on listed marine mammals or sea turtles will be transmitted to NMFS and COE within 48 hours.

Part 2.
The permittee shall implement the following specific measures meant to reduce the potential for vessel harassments or collisions with ESA-listed marine mammals or sea turtles during all phases of the project.

1. All vessels and aircraft associated with the construction, operation/maintenance and/or decommissioning of the project will be required to abide by the: (1) NOAA Fisheries Northeast Regional Viewing Guidelines, as updated through the life of the project (http://www.nmfs.noaa.gov/pr/pdfs/education/viewing_northeast.pdf); and (2) MMS Gulf of Mexico Region's NTL No. 2007-G04 (http://www.gomr.mms.gov/homepg/regulate/regs/ntls/2007NTLs/07-g04.pdf), or any superseding NTL.

2. All vessel and aircraft operators must undergo training to ensure they are familiar with the guidance in #1 above. These training requirements must be written into any contractor agreements.
3. All personnel and contractors will be advised that there are civil and criminal penalties for harming, harassing, or killing marine mammals and sea turtles, which are protected under MMPA and ESA.
4. All vessels associated with the project will operate at idle speed at all times while in shallow waters where the draft of the vessel provides less than a four foot clearance from the bottom.
5. Any collision with *any* marine mammal must be reported. More information can be found at http://www.nmfs.noaa.gov/pr/shipstrike/msr/.
    a. Vessels transiting MSR areas are required to report their course, speed, position, destination, and route to the U.S. Coast Guard upon entry into the reporting area. Vessels should report via INMARSAT C to one of the following addresses: Email: RightWhale.MSR@noaa.gov or Telex: 236737831. Vessels not equipped with INMARSAT C should report via alternate satellite communications equipment to one of the following addresses: Email: RightWhale.MSR@noaa.gov or Telex: 236737831. Vessels unable to use satellite communications equipment should contact the U.S. Coast Guard Communication Area Master Station, Chesapeake, Virginia via SITOR/NBDP on 8426.3 kHz, 12590.8 kHz, 16817.8 kHz twenty four hours per day, or 6314.3 kHz from 2300 GMT until 1100 GMT and 22387.8 kHz from 1100 GMT until 2300 GMT.
    b. Vessels unable to use satellite communications or SITOR/NBDP should contact the U.S. Coast Guard Communication Area Master Station, Chesapeake, Virginia via published voice frequencies.
    c. Mariners can learn more about steps to avoid collisions with whales at: http://www.nmfs.noaa.gov/pr/pdfs/shipstrike/marinersweatherlog_shipstrike.pdf

The Delaware Nation
Cultural Preservation Office
P.O. Box 825 - 31064 State Highway 281- Anadarko, OK 73005
Phone: 405/247-2448 – Fax: 405/247-8905

NAGPRA ext. 1403
Section 106 ext. 1181
Museum ext. 1181
Library ext. 1196
Clerk ext. 1182

May 15, 2015

RE: DOE & USACE Request for Re-Initiation of Section 106 Consultation for Fishermen's Atlantic City Windfarm, LLC

Ms. Minnichbach,

The Delaware Nation Cultural Preservation Department received correspondence regarding the above referenced project. Our office is committed to protecting sites important to tribal heritage, culture and religion. Furthermore, the tribe is particularly concerned with archaeological sites that may contain human burials or remains, and associated funerary objects.

As described in your correspondence and upon research of our database(s) and files, we find that the Lenape people occupied this area either prehistorically or historically. However, the location of the project does not endanger cultural or religious sites of interest to the Delaware Nation. <u>Please continue with the project as planned.</u> However, should this project inadvertently uncover an archaeological site or object(s), we request that you halt all construction and ground disturbance activities and immediately contact the appropriate state agencies, as well as our office (within 24 hours).

Please Note the Delaware Nation, the Delaware Tribe of Indians, and the Stockbridge Munsee Band of Mohican Indians are the only Federally Recognized Delaware/Lenape entities in the United States and consultation must be made only with designated staff of these three tribes. We appreciate your cooperation in contacting the Delaware Nation Cultural Preservation Office to conduct proper Section 106 consultation. Should you have any questions regarding this email or future consultation feel free to contact our offices at 405-247-2448 or by email nalligood@delawarenation.com.

Sincerely,

Nekole Alligood

Nekole Alligood
Director

Department of Energy
Golden Field Office
15013 Denver West Parkway
Golden, Colorado 80401

June 10, 2015

Daniel Saunders
Deputy State Historic Preservation Officer
Mail Code 501-04B
State of New Jersey
Department of Environmental Protection
Historic Preservation Office
PO Box 420
Trenton, NJ 08625-0420

SUBJECT: Submittal of Additional Information to Address HPO Section 106 Comments for Fishermen's Atlantic City Windfarm, LLC - HPO project number 08-0485

Pursuant to Section 106 of the *National Historic Preservation Act* of 1966 (NHPA) as amended, and its associated implementing regulations codified at 36 CFR Part 800, the U.S. Department of Energy (DOE) and the U.S. Army Corps of Engineers, Philadelphia District (USACE) by letter dated February 17, 2015 requested re-initiation of consultation with your office concerning the proposed undertaking and its potential to affect historic properties:

Atlantic County, Atlantic City
Proposed Construction of Six Wind Turbine Generators
Fishermen's Atlantic City Windfarm, LLC
United States Department of Energy

Your office requested additional information and provided comments by letter dated April 1, 2015 on the proposed undertaking. In response, DOE is submitting the enclosed Viewshed Analysis Report to address your request for additional information and comments.

Assessment of Effect

Based on the information in the enclosed Viewshed Analysis Report and information submitted previously during the Section 106 process, DOE as the funding agency, and USACE, as the permitting agency, have determined that no historic properties would be adversely affected by the indirect visual impacts of their funding and permitting actions. DOE and USACE respectfully request your concurrence in this determination.

Please send any correspondence to:

U.S. Department of Energy
Golden Field Office
Attn: Ms. Lori Gray
NEPA Division Director
15013 Denver West Parkway
Golden, CO 80401

U.S. Army Corps of Engineers
Regulatory Branch, Philadelphia District
Attn: Ms. Nicole Minnichbach
Cultural Resource Specialist/Tribal Liaison
Wanamaker Building
100 Penn Square East
Philadelphia, PA 19107-3390

If you have any questions or require any additional information, please contact me at (720)356-1568 or lori.gray@ee.doe.gov or Nicole Minnichbach, USACE at 215-656-6556 or Nicole.C.Minnichbach@usace.army.mil.

Sincerely,

Lori Gray

Lori Gray
NEPA Division Director

Enclosure: as stated

Electronic cc:
Jesse West-Rosenthal, NJ-HPO
Michael Hahn, DOE
Roak Parker, DOE
Nicole Cooper Minnichbach, USACE
Lawrence M Slavitter, USACE
Janet Stewart, NJDEP, DLUR
Richard Helfant - Lucy

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
55 Great Republic Drive
Gloucester, MA 01930-2276

JUN 22 2015

Timothy Meeks
U.S Department of Energy
Golden Field Office
NEPA Division Director
15013 Denver West Parkway
Golden, CO 80401

RE: DOE and USACE Request for Re-initiation of the Magnuson Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for Fishermen's Energy Atlantic City Windfarm, LLC.

Dear Mr. Meeks:

We have reviewed the essential fish habitat (EFH) assessment prepared for Fishermen's Energy of New Jersey, LLC's proposal to install six wind turbines in the Atlantic Ocean approximately 2.8 miles offshore of Atlantic City, Atlantic County, New Jersey. The U.S. Department of Energy (DOE) is proposing to provide funding for Fishermen's Atlantic City Wind Farm (FACW) while the US Army Corps of Engineers (USACE), Philadelphia District has regulatory and permitting authority. The USACE issued Department of the Army (DA) Permit CENAP-OP-R-2008-077-39 for this project on June 14, 2012. Since the issuance of the permit, the project plans have been modified and changes to the pile jacket type, pile number and size, turbine specifications, and cable size and burial depth have been proposed. The permittee has also requested that the expiration date of the permit be extended from December 31, 2015, to December 31, 2018. The DOE has reinitiated the EFH consultation pursuant to Magnuson-Stevens Fishery Conservation and Management Act (MSA) as a result of the proposed project modifications.

The currently proposed project includes the construction, operation, maintenance and eventual decommissioning of six wind turbines that would generate a maximum of approximately 25 megawatts (MW) of electricity, a 33-kilovolt (kV) alternating current (AC) submarine transmission cable interconnecting the turbines (array cables), a 33-kV AC submarine transmission cable (export cable), and a 33-kV AC underground cable (onshore interconnection cable) that would connect the proposed project with the existing onshore infrastructure in Atlantic City, New Jersey.

The turbine array would be oriented in a single row parallel to the coastline running northeast to southwest. The space between each turbine would be approximately 3,553 ft. The array cables and the export cable will be up to five inches in diameter, rated to 35kV AC, and consist of composite cables sheathed in high density polyethylene. The cables will be installed to a target depth of six feet below the existing seabed using a jet plow. The export cable would be installed from the array cable to a point approximately 1800 ft. from the shoreline. Horizontal directional drilling would then be used to bring the export cable onshore to connect to existing onshore facilities.

Each wind turbine would be supported by an Inward Battered Guide Structure (IBGS) jacket-type foundation driven approximately 150 ft. into the seafloor. The IBGS jacket-type foundation consists of four legs, with each leg being a hollow steel pipe approximately 84 inches (seven ft.) in diameter. Installation and commissioning of each of the turbines is expected to require four to seven fair weather days to complete. The work would be done using either a jack up barge or a floating crane barge. The maximum sound generation for each pile would be approximately 199 dB (re 1 uPa) at the source. Due to the redesign of the towers, scour protection mats will not be needed.

The total ocean area considered as the project area is approximately 170 acres (calculated as the perimeter around the group of six turbines, approximately 200 ft. in each direction) plus a five ft. width along the length of the export cable route, however, the actual area that would be physically disturbed by the placement of the turbines and cable is approximately 2 acres.

Fishermen's Energy currently has a Memorandum of Understanding with South Jersey Port Corporation to use their existing Beckett Street Terminal on the Delaware River in Camden, New Jersey for the staging of the project. No additional construction at the Beckett Street Terminal is needed to support this work.

The operational period for this project is currently planned for 25 years, but the potential for equipment upgrades and continuation operations beyond 25 years would be evaluated throughout the project life. When it is determined that the project is to be decommissioned, all physical elements of the project would be removed and the site would be restored to its pre-construction condition.

Essential Fish Habitat

The project are has been designated as EFH for a wide variety of federally managed species including Atlantic cod (*Gadus morhua*), Atlantic butterfish (*Peprilus triacanthus*), Atlantic sea herring (*Clupea harengus*), bluefish (*Pomatomus saltatrix*), black sea bass (*Centropristis striata*), monkfish (*Lophius americanus*), red hake (*Urophycis chuss*), scup (*Stenotomus chrysops*), summer flounder (*Paralichthys dentatus*), windowpane flounder (*Scophthalmus aquosus*), winter flounder (*Pseudopleuronectes americanus*), cobia (*Rachycentron canadum*), king mackerel (*Scomberomorus cavalla*), Spanish mackerel (*Scomberomorus maculatus*), winter skate (*Leucoraja ocellata*), little skate (*Leucoraja erinacea*), clearnose skate (*Raja eglanteria*), dusky shark (*Carcharhinus obscurus*), sandbar shark (*Carcharhinus plumbeus*) and tiger shark (*Galeocerdo cuvier*).

The MSA requires federal agencies to consult with us on any action or proposed action authorized, funded, or undertaken by the agency that may adversely affect EFH. Because elevated noise levels, physical habitat disturbance, and water quality impacts resulting from the construction, operation and decommissioning of the FACW will affect EFH, this process is guided by the requirements of our EFH regulation at 50 CFR 600.905, which mandates the preparation of EFH assessments, lists the required contents of EFH assessments, and generally outlines each agency's obligations in this consultation process.

We have reviewed the EFH assessment for this project and the proposed modifications. Overall, the assessment appears to evaluate adequately the potential effects of the project on EFH, federally managed species and their prey based upon the information available currently. The DOE has concluded that the funding of this project and the proposed modifications will have limited adverse effects on EFH. Permanent effects considered included the loss of benthic habitat within the footprint of each pile, possible alterations in the sediment composition around the piles, sound impacts from the operation of the turbines, and the effects of emission of electromagnetic fields (EMFs) into the water column from the transmission of electric current through the cable. We do not expect these impacts to be significant. Burial of the cable six feet below the seafloor will reduce the exposure of sensitive organisms to EMFs. In addition, monitoring of the sound and EMFs will be incorporated into the post-construction monitoring plans for the project

The majority of the impacts to EFH will occur during construction and possibly during the decommissioning of the project. These impacts are expected to be temporary and not significant. Temporary construction related impacts include the disturbance of the benthic habitat, increased turbidity and decreased water quality during the pile driving and cable installation as a result of anchoring the jack-up barge or other support vessels, the jet plowing of the cable and opening of the borehole where the HDD conduit will break out into the seafloor. In addition, noise generated from these activities, primarily the pile driving, could have pathological, physiological, or behavioral effects on marine fish including injury, mortality or behavioral changes as a result of the changes in sound pressure. However, soft-start procedures at the beginning of impact pile driving may reduce the impacts by causing fish to move out of the immediate area so they are exposed to reduced levels of noise.

Modification and/or disturbance of the existing substrate during jet plowing, operation of the jack up barge and the exiting of the HDD cable at the offshore breakout point may increase the amount of suspended sediment in and adjacent to the project area. Increased turbidity may interfere with feeding, predation, and other behavior patterns of EFH species. Considering the availability of similar benthic habitat in the immediate vicinity of construction activities and the mobile nature of juvenile and adult life stages that would be found in the lower water column, we expect the impacts from increased turbidity to be relatively small, localized, and temporary. Overall, we expect that impacts to EFH from changes to water quality will be minimal.

EFH Conservation Recommendation

To minimize impacts to EFH, we offer the following conservation recommendations pursuant to section 305(b)(4)(A) of the MSA.

- Use a reduced soft-start method to provide additional protection to fish by allowing them to vacate the immediate area prior to the start of full-energy pile driving activities
- Conduct acoustic monitoring of pile driving activities during the installation of each foundation requiring pile driving and provide us with the monitoring results. Specifically, take acoustic measurements at a minimum of two reference locations

sufficient to establish the source level and distance to the 150 dB re 1µPa (RMS) sound pressure level isopleth and the 187 dB re 1 µPa cumulative sound exposure level.

- Provide us with any environmental monitoring results associated with impacts to benthic habitat, water quality, and noise exposure.
- Reinitiate EFH consultation prior to decommissioning turbines to ensure that the impact to EFH as a result of the decommissioning activities have been evaluated and minimized to the extent practicable.

Please note that a distinct and further EFH consultation must be reinitiated by DOE pursuant to 50 CFR 600.920 (j) if new information becomes available, or if the project is revised in such a manner that affects the basis for the above determination. Should you have any questions about this matter, please contact Karen Greene at 732-872-3023 or karen.greene@noaa.gov .

Endangered Species Act

Threatened or endangered species under the jurisdiction of NOAA Fisheries may be present in the project area. The Protected Resources Division issued a letter dated May 11, 2015, concluding that the reinitiation of the Section 7 consultation for this project is not necessary. Further questions regarding this consultation should be directed to Julie Crocker at 978-282-8480 or julie.crocker@noaa.gov .

Sincerely,

Louis A. Chiarella
Assistant Regional Administrator
Habitat Conservation Division

Identical Letter to:
Frank Cianfrani, Chief
USACE
Philadelphia, PA 19107-3390

cc: M. Murray-Brown (PRD)

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF LAND USE REGULATION
Mail Code 501-02A, P.O. Box 420, Trenton, NJ 08625-0420
TEL: # (609) 777-0454
FAX # (609) 777-3656

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

Fishermen's Atlantic City Windfarm, LLC
c/o Chris Wissemann
1616 Pacific Avenue, Suite 400
Atlantic City, NJ 08401

JUL 01 2015

RE: Application for Modification to Waterfront Development Permit & Water Quality Certificate (File #0102-09-0024.2, WFD100001 & CDT100001)
File No.: 0102-09-0024.2, WFD140001
Applicant: Fishermen's Atlantic City Windfarm, LLC
Block(s): N/A Lot(s): N/A
Project Location: ± 2.8 miles offshore of Atlantic City
Atlantic City, Atlantic County

Dear Mr. Wissemann:

This is with reference to your request for a modification to the above project, which was granted a CAFRA Individual Permit, Waterfront Development Permit and Water Quality Certificate on March 29, 2011 (LUR File #0102-09-0024.2, CAF100001, WFD100001 and CDT100001) to install six (6) marinized wind turbines (4 MW nominal power rating each) and appurtenant submarine cables, located approximately 2.8 nautical miles off-shore of Atlantic City, for creating clean renewable energy.

The subject application proposes to modify specific aspects of the project within the Atlantic Ocean (waterward of the Mean High Water Line), requiring a modification to the Waterfront Development Permit and Water Quality Certificate. No modifications are proposed upland of the Mean High Water Line; therefore, no modification to the CAFRA Individual Permit is necessary.

The currently proposed permit modification involves the following:

1. A clarification that up to six (6) Siemens 4.0-130 turbines (4 MW nominal power rating each), for a maximum output of approximately 24 MW are authorized.
2. Modify the turbine foundation type from the previously authorized monopole to a jack-type foundation. Each turbine foundation is an IBGS which consists of four legs. The foundation will be anchored to the seabed by steel pilings, seven feet (84 inches) in diameter, driven to a depth of approximately 150 feet below the seabed using an impact hammer.
3. Eliminate the previously authorized ± 5,820 cubic yards of rock scour protection at the base of each monopole (total of ± 34,920 cubic yards of scour protection) due to the foundation change.

4. Modify the transition point for HDD to jet-plow cable installation from 2,200 feet to 1,800 feet offshore of the Tennessee Avenue beach.
5. Reduce the subsea cable burial depth to allow for a target burial depth of six (6) feet below the seabed.
6. Modify the size of the subsea cable to allow for the use of a cable with a diameter of 8 inches or less.
7. Clarify that the subsea cable route was previously authorized from turbine #3 to the shore landing at the base of Tennessee Avenue.

The Department has no objection to these proposed changes to the project and therefore approves your request for a modification, provided the below conditions are met. All terms and conditions of the original approval remain in effect and this letter only extends the original permit expiration date pursuant to the Permit Extension Act (N.J.S.A. 40:55D-136.1 et seq. as amended), to June 30, 2016.

Conditions

1. This permit modification is issued subject to compliance with LUR File #0102-09-0024.2, CAF100001, WFD100001 and CDT100001.

2. The permittee shall obtain all other applicable Federal, State and local approvals, including Section 408 authorization from the Department of the Army, Army Corps of Engineers.

Approved Plans

The modified plans hereby approved are as follows:

- Sheet No. 1 of 1 entitled "Overall Site Plan", dated November 27, 2014, last revised December 4, 2014, and prepared by William J. Mikula, PE of AMEC Environment & Infrastructure.
- Eight (8) sheets collectively entitled "Fishermen's Atlantic City Windfarm, LLC, 25 MW Offshore Windfarm, Offshore Atlantic County, New Jersey, AMEC Project No. 775230003, May 5, 2010 (Revision 5 – December 5, 2014)", dated December 2014, last revised December 5, 2014, and prepared by William J. Mikula, PE of AMEC Environment & Infrastructure.

Appeal of Decision

In accordance with N.J.A.C. 7:7-5.1, any person who is aggrieved by this decision may request a hearing within 30 days of the decision date by writing to: New Jersey Department of Environmental Protection, Office of Legal Affairs, Attention: Adjudicatory Hearing Requests, CN 402, Trenton, NJ 08625-0402. This request must include a completed copy of the Administrative Hearing Request Checklist.

If you have any questions regarding this authorization, please contact Janet Stewart of our staff at (609) 984-6216 or by email at janet.stewart@dep.nj.gov. Please reference the above file number.

State of New Jersey
MAIL CODE 501-04B
DEPARTMENT OF ENVIRONMENTAL PROTECTION
NATURAL & HISTORIC RESOURCES
HISTORIC PRESERVATION OFFICE
P.O. Box 420
Trenton, NJ 08625-0420
TEL. (609) 984-0176 FAX (609) 984-0578

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

July 15, 2015

Lori Gray
NEPA Division Director
Department of Energy
Golden Field Office
15013 Denver West Parkway
Golden, Colorado 80401

Dear Ms. Gray:

As Deputy State Historic Preservation Officer for New Jersey, in accordance with 36 CFR Part 800: Protection of Historic Properties, as published in the *Federal Register* on December 12, 2000 (65 FR 77725-77739) and amended on July 6, 2004 (69 FR 40544-40555), I am providing Consultation Comments for the following proposed undertaking:

Atlantic County, Atlantic City
Proposed Construction of Six Wind Turbine Generators
Fisherman's Atlantic City Windfarm, LLC
United States Department of Energy

800.5 Assessment of Adverse Effects

Thank you for providing the Historic Preservation Office (HPO) with the opportunity to review and comment on the revised viewshed analysis for the above-referenced undertaking. The HPO has reviewed the revised analysis and believes that our comments have been adequately addressed. Please note however, the HPO is unable to evaluate the Department of Energy's (DOE) finding of effect at this time.

In our letter dated April 1, 2015, the HPO identified the inclusion of Richard Helfant, the Executive Director / C.E.O. of Lucy the Elephant, as a consulting party for purposes of Section 106 consultation. However, it is unclear at this time whether Mr. Helfant has been provided the relevant information regarding the DOE's identification-level efforts and assessment of effects, as well as whether he has been provided the appropriate amount of time to comment on the proposed undertaking. Please provide the HPO with documentation that the appropriate consulting parties have been provided the opportunity to comment on the proposed undertaking, as well as any responses they have provided. Once this information has been received by the HPO, only then will this office be able to fully evaluate the DOE's assessment of effects.

Additional Comments

Thank you for providing the opportunity to review and comment on the potential for the above-referenced project to affect historic properties. The HPO looks forward to receiving the requested information. Please reference the HPO project number 10-1023, in any future calls, emails, or written correspondence to help expedite your review and response. Please do not hesitate to contact Jesse West-Rosenthal (609-984-6019) of my staff with questions regarding archaeology.

Sincerely,

Daniel D. Saunders
Deputy State Historic
Preservation Officer

Cc: Nicole Minnichbach - USACE
Janet Stewart – NJDEP, DLUR

DDS/MC/JWR

Department of Energy
Golden Field Office
15013 Denver West Parkway
Golden, Colorado 80401

August 31, 2015

Daniel Saunders
Deputy State Historic Preservation Officer
Mail Code 501-04B
State of New Jersey
Department of Environmental Protection
Historic Preservation Office
PO Box 420
Trenton, NJ 08625-0420

SUBJECT: Submittal of Additional Information to Address HPO Section 106 Comments for Fishermen's Atlantic City Windfarm, LLC - HPO project number 10-1023

In a letter dated July 15, 2015, your office requested documentation that consulting parties have been provided the opportunity to comment on the proposed undertaking, as well as any responses they have provided. In response to this request, the U.S. Department of Energy (DOE) is submitting the attached email correspondence between DOE and Mr. Richard Helfant, the Executive Director / C.E.O of Lucy the Elephant as a consulting party for purposes of Section 106 consultation.

If you have any questions or require any additional information, please contact me at (720)356-1568 or lori.gray@ee.doe.gov.

Sincerely,

Lori Gray

Lori Gray
NEPA Division Director

Enclosure: as stated

Electronic cc:
Jesse West-Rosenthal, NJ-HPO
Roak Parker, DOE
Nicole Cooper Minnichbach, USACE
Lawrence M Slavitter, USACE
Janet Stewart, NJDEP, DLUR
Richard Helfant - Lucy

From: Rich Helfant
To: Gray, Lori
Subject: Re: Section 106 consultation of the National Historic Preservation Act - Response Requested
Date: Monday, August 24, 2015 12:07:30 PM

Hi Lori,
We have received and reviewed the documents you sent. As presented, we see no negative impact on Lucy the Elephant.

Please let us know if you require anything further.

Regards,

Richard D. Helfant
Executive Director/ C.E.O.
Lucy the Elephant

9200 Atlantic Ave.
Margate City, NJ 08402-2449
Phone: (609) 823-6473, Ext. 5
Fax: (609) 823-1895
rhelfant@lucytheelephant.org
www.lucytheelephant.org

"CLIMB THE WORLD'S LARGEST ELEPHANT"

-----Original Message-----
From: Gray, Lori <Lori.Gray@ee.Doe.Gov>
To: 'rhelfant@lucytheelephant.org' <rhelfant@lucytheelephant.org>
Sent: Thu, Aug 20, 2015 4:16 pm
Subject: RE: Section 106 consultation of the National Historic Preservation Act - Response Requested

Dear Mr. Helfant,
I am following up on the below email messages. I also phoned you on Friday August 14 and left a message. DOE is not going to be able to move forward on this project until the Section 106 process is completed. I would really appreciate your response or an opportunity to provide you with any additional information you may require. I will contact your office on Monday, August 24 to see if there is anything you need from DOE for your review.
Thank you!
Lori

Lori A. Gray
NEPA Division Director
U.S. Department of Energy
Golden Field Office
15013 Denver West Parkway
Golden, CO 80401
720-356-1568 (office)
720-233-8236
lori.gray@ee.doe.gov

-----Original Message-----
From: Gray, Lori
Sent: Friday, August 14, 2015 8:38 AM
To: 'rhelfant@lucytheelephant.org'
Subject: FW: Section 106 consultation of the National Historic Preservation Act - Response Requested
Importance: High

Dear Mr. Helfant,
Please see messages below concerning DOE Section 106 consultation for which you have been identified as a consulting party. I am not sure that you received these as I used a different email address.
Thanks!
Lori

Lori A. Gray
NEPA Division Director
U.S. Department
of Energy
Golden Field Office
15013 Denver West Parkway
Golden, CO
80401
720-356-1568
(office)
720-233-8236
lori.gray@ee.doe.gov

-----Original
Message-----
From: Gray, Lori
Sent: Monday, August 03, 2015 4:51 PM
To:
'elephantlucy@aol.com'
Subject: Section 106 consultation of the National Historic Preservation Act - Response Requested
Importance: High

Dear Mr.
Helfant,

I am with the U.S. Department of Energy. I had previously sent you via certified mail the attached correspondence and viewshed analysis for your use. In addition, it is my understanding you have been contacted by Fishermen's Energy concerning their offshore Atlantic City Windfarm project.

I wanted to follow up to see if you need additional information or have any questions. Also, the State of New Jersey Historic Preservation Office is requesting confirmation that you have been provided the relevant information regarding DOE's identification-level of efforts and assessment of effects. I have attached the correspondence from the Historic Preservation Office for your use.

Could you please contact me at your earliest convenience and let me know if you need additional information or additional time to review the attached viewshed analysis?

If you do not need additional information or time, I would greatly appreciate a confirmation email from you that you have been provided the relevant information and your comments (if any) that you might have. Your response is needed to conclude the Section 106 consultation with the New Jersey Historic Preservation Office.

Thank you!

Lori

Lori A.
Gray
NEPA Division Director
U.S. Department of Energy
Golden Field
Office
15013 Denver West Parkway
Golden, CO 80401
720-356-1568
(office)
720-233-8236
lori.gray@ee.doe.gov

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2015-WTE-1854-OE

Issued Date: 11/04/2015

Steve O'Malley
Fishermen's Atlantic City Windfarm, LLC
1616 Pacific Avenue
Suite 402
Atlantic City, NJ 08401

** DETERMINATION OF NO HAZARD TO AIR NAVIGATION **

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine Turbine 1
Location:	Atlantic City, NJ
Latitude:	39-17-59.80N NAD 83
Longitude:	74-26-12.93W
Heights:	0 feet site elevation (SE) 509 feet above ground level (AGL) 509 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure would have no substantial adverse effect on the safe and efficient utilization of the navigable airspace by aircraft or on the operation of air navigation facilities. Therefore, pursuant to the authority delegated to me, it is hereby determined that the structure would not be a hazard to air navigation provided the following condition(s) is(are) met:

As a condition to this Determination, the structure is marked/lighted in accordance with FAA Advisory circular 70/7460-1 K Change 2, Obstruction Marking and Lighting, white paint/synchronized red lights - Chapters 4,12&13(Turbines).

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

__X__ At least 10 days prior to start of construction (7460-2, Part 1)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part 2)

See attachment for additional condition(s) or information.

Any height exceeding 509 feet above ground level (509 feet above mean sea level), will result in a substantial adverse effect and would warrant a Determination of Hazard to Air Navigation.

This determination expires on 05/04/2017 unless:

(a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
(b) extended, revised, or terminated by the issuing office.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is subject to review if an interested party files a petition that is received by the FAA on or before December 04, 2015. In the event a petition for review is filed, it must contain a full statement of the basis upon which it is made and be submitted to the Manager, Airspace Policy & Regulation, Federal Aviation Administration, 800 Independence Ave, SW, Room 423, Washington, DC 20591.

This determination becomes final on December 14, 2015 unless a petition is timely filed. In which case, this determination will not become final pending disposition of the petition. Interested parties will be notified of the grant of any review. For any questions regarding your petition, please contact Airspace Regulations & ATC Procedures Group via telephone -- 202-267-8783 - or facsimile 202-267-9328.

This determination is based, in part, on the foregoing description which includes specific coordinates, heights, frequency(ies) and power. Any changes in coordinates, heights, and frequencies or use of greater power will void this determination. Any future construction or alteration, including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.

Obstruction marking and lighting recommendations for wind turbine farms are based on the scheme for the entire project. ANY change to the height, location or number of turbines within this project will require a reanalysis of the marking and lighting recommendation for the entire project. In particular, the removal of previously planned or built turbines/turbine locations from the project will often result in a change in the marking/lighting recommendation for other turbines within the project. It is the proponent's responsibility to contact the FAA to discuss the process for developing a revised obstruction marking and lighting plan should this occur.

In order to ensure proper conspicuity of turbines at night during construction, all turbines should be lit with temporary lighting once they reach a height of 200 feet or greater until such time the permanent lighting configuration is turned on. As the height of the structure continues to increase, the temporary lighting should be relocated to the uppermost part of the structure. The temporary lighting may be turned off for periods when they would interfere with construction personnel. If practical, permanent obstruction lights should be installed and operated at each level as construction progresses. An FAA Type L-810 steady red light fixture shall be used to light the structure during the construction phase. If power is not available, turbines shall be lit with self-contained, solar powered LED steady red light fixture that meets the photometric requirements of an FAA Type L-810 lighting system. The lights should be positioned to ensure that a pilot has an unobstructed view of at least one light at each level. The use of a NOTAM (D) to not light turbines within a project until the entire project has been completed is prohibited.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

Any failure or malfunction that lasts more than thirty (30) minutes and affects a top light or flashing obstruction light, regardless of its position, should be reported immediately to (877) 487-6867 so a Notice to Airmen (NOTAM) can be issued. As soon as the normal operation is restored, notify the same number.

This aeronautical study considered and analyzed the impact on existing and proposed arrival, departure, and en route procedures for aircraft operating under both visual flight rules and instrument flight rules; the impact on all existing and planned public-use airports, military airports and aeronautical facilities; and the cumulative impact resulting from the studied structure when combined with the impact of other existing or proposed structures. The study disclosed that the described structure would have no substantial adverse effect on air navigation.

An account of the study findings, aeronautical objections received by the FAA during the study (if any), and the basis for the FAA's decision in this matter can be found on the following page(s).

If we can be of further assistance, please contact Cindy Whitten, at (816) 329-2528. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2015-WTE-1854-OE.

Signature Control No: 249768443-271176127 (DNH -WT)
Mike Helvey
Manager, Obstruction Evaluation Group

Attachment(s)
Additional Information
Map(s)

Additional information for ASN 2015-WTE-1854-OE

The proposal was circularized on August 10, 2015, to all known aviation interests and to non-aeronautical interests that may be affected by the proposal. No comments or objections were received.

Proposal: To construct a Wind Turbine to a height of 509 feet above ground level, 509 feet above mean sea level.

Location: The structure will be located 8.24 nautical miles east of the airport reference point for the Ocean City Municipal Airport (26N), Ocean City, NJ.

Part 77 Obstruction Standard(s) Exceeded:

Section 77.17 (a) (1) by 10 feet - a height more than 500 feet above ground level.

Aeronautical study disclosed that the proposed structure would have no effect on existing or proposed arrival, departure, or en route instrument flight rule (IFR) operations or procedures.

The proposed structure would have no effect on any existing or proposed IFR minimum flight altitudes or minimum vectoring altitudes.

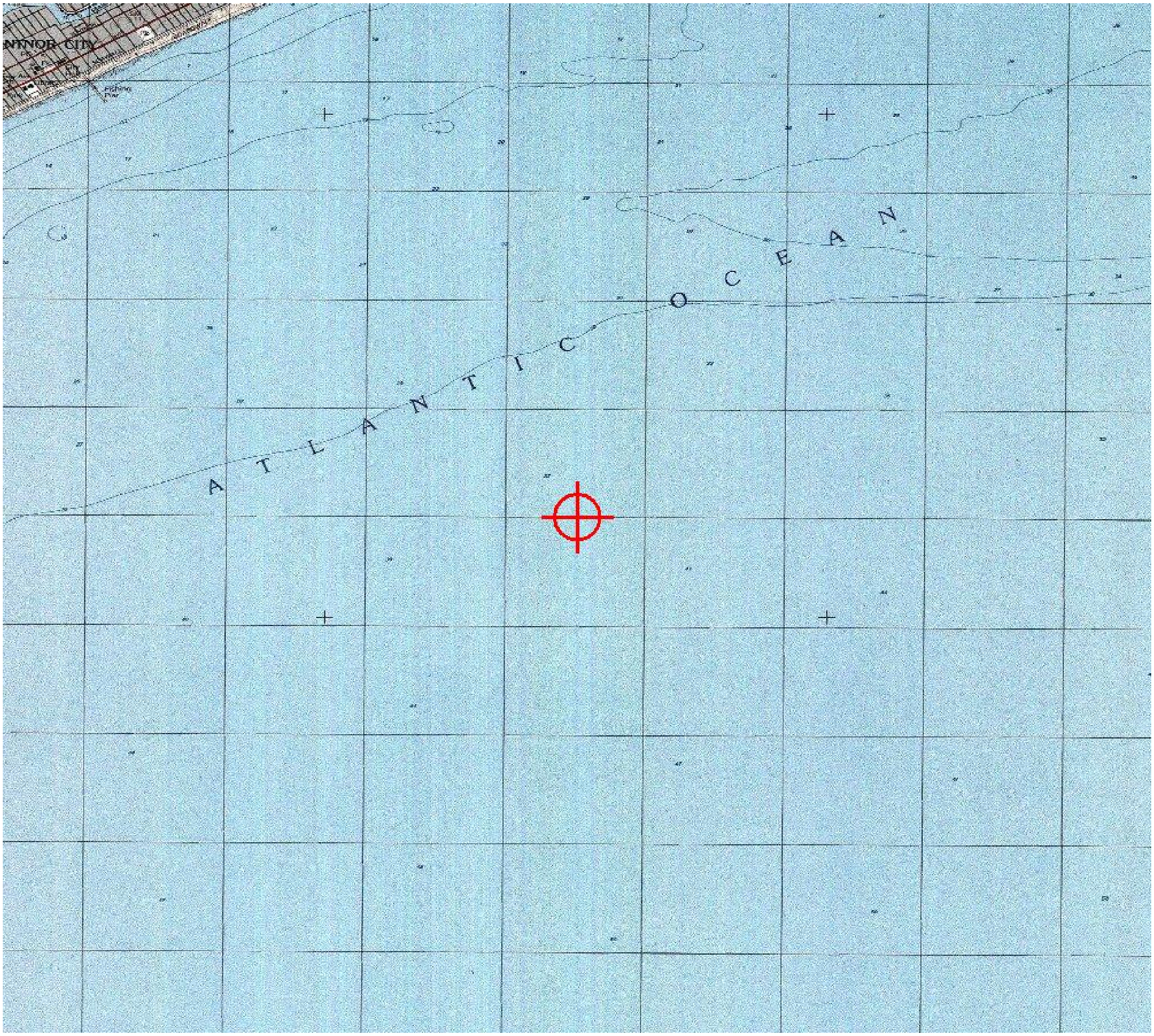
The proposed structure would not penetrate those altitudes normally considered available to airmen for VFR en route flight. The structure would not be located within the traffic pattern airspace; therefore, it will not conflict with airspace required to conduct normal VFR traffic pattern and/or visual approach operations at 26N or any other known public use or military airports.

The proposed structure will be appropriately obstruction lighted with red lights and paint to make it more conspicuous to airmen should circumnavigation be necessary.

The cumulative impact of the proposed structure, when combined with other proposed and existing structures, is not considered to be significant. Study did not disclose any adverse effect on existing or proposed public-use or military airports or navigational facilities, nor would the proposal affect the capacity of any known existing or planned public-use or military airport.

Therefore, it is determined that the proposed structure would not have a substantial adverse effect on the safe and efficient utilization of the navigable airspace by aircraft or on any air navigation facility and would not be a hazard to air navigation providing the conditions set forth in this determination are met.

TOPO Map for ASN 2015-WTE-1854-OE



Sectional Map for ASN 2015-WTE-1854-OE

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2015-WTE-1855-OE

Issued Date: 11/04/2015

Steve O'Malley
Fishermen's Atlantic City Windfarm, LLC
1616 Pacific Avenue
Suite 402
Atlantic City, NJ 08401

** DETERMINATION OF NO HAZARD TO AIR NAVIGATION **

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine Turbine 2
Location:	Atlantic City, NJ
Latitude:	39-18-17.88N NAD 83
Longitude:	74-25-34.24W
Heights:	0 feet site elevation (SE) 509 feet above ground level (AGL) 509 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure would have no substantial adverse effect on the safe and efficient utilization of the navigable airspace by aircraft or on the operation of air navigation facilities. Therefore, pursuant to the authority delegated to me, it is hereby determined that the structure would not be a hazard to air navigation provided the following condition(s) is(are) met:

As a condition to this Determination, the structure is marked/lighted in accordance with FAA Advisory circular 70/7460-1 K Change 2, Obstruction Marking and Lighting, white paint/synchronized red lights - Chapters 4,12&13(Turbines).

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

__X__ At least 10 days prior to start of construction (7460-2, Part 1)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part 2)

See attachment for additional condition(s) or information.

Any height exceeding 509 feet above ground level (509 feet above mean sea level), will result in a substantial adverse effect and would warrant a Determination of Hazard to Air Navigation.

This determination expires on 05/04/2017 unless:

(a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
(b) extended, revised, or terminated by the issuing office.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is subject to review if an interested party files a petition that is received by the FAA on or before December 04, 2015. In the event a petition for review is filed, it must contain a full statement of the basis upon which it is made and be submitted to the Manager, Airspace Policy & Regulation, Federal Aviation Administration, 800 Independence Ave, SW, Room 423, Washington, DC 20591.

This determination becomes final on December 14, 2015 unless a petition is timely filed. In which case, this determination will not become final pending disposition of the petition. Interested parties will be notified of the grant of any review. For any questions regarding your petition, please contact Airspace Regulations & ATC Procedures Group via telephone -- 202-267-8783 - or facsimile 202-267-9328.

This determination is based, in part, on the foregoing description which includes specific coordinates, heights, frequency(ies) and power. Any changes in coordinates, heights, and frequencies or use of greater power will void this determination. Any future construction or alteration, including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.

Obstruction marking and lighting recommendations for wind turbine farms are based on the scheme for the entire project. ANY change to the height, location or number of turbines within this project will require a reanalysis of the marking and lighting recommendation for the entire project. In particular, the removal of previously planned or built turbines/turbine locations from the project will often result in a change in the marking/lighting recommendation for other turbines within the project. It is the proponent's responsibility to contact the FAA to discuss the process for developing a revised obstruction marking and lighting plan should this occur.

In order to ensure proper conspicuity of turbines at night during construction, all turbines should be lit with temporary lighting once they reach a height of 200 feet or greater until such time the permanent lighting configuration is turned on. As the height of the structure continues to increase, the temporary lighting should be relocated to the uppermost part of the structure. The temporary lighting may be turned off for periods when they would interfere with construction personnel. If practical, permanent obstruction lights should be installed and operated at each level as construction progresses. An FAA Type L-810 steady red light fixture shall be used to light the structure during the construction phase. If power is not available, turbines shall be lit with self-contained, solar powered LED steady red light fixture that meets the photometric requirements of an FAA Type L-810 lighting system. The lights should be positioned to ensure that a pilot has an unobstructed view of at least one light at each level. The use of a NOTAM (D) to not light turbines within a project until the entire project has been completed is prohibited.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

Any failure or malfunction that lasts more than thirty (30) minutes and affects a top light or flashing obstruction light, regardless of its position, should be reported immediately to (877) 487-6867 so a Notice to Airmen (NOTAM) can be issued. As soon as the normal operation is restored, notify the same number.

This aeronautical study considered and analyzed the impact on existing and proposed arrival, departure, and en route procedures for aircraft operating under both visual flight rules and instrument flight rules; the impact on all existing and planned public-use airports, military airports and aeronautical facilities; and the cumulative impact resulting from the studied structure when combined with the impact of other existing or proposed structures. The study disclosed that the described structure would have no substantial adverse effect on air navigation.

An account of the study findings, aeronautical objections received by the FAA during the study (if any), and the basis for the FAA's decision in this matter can be found on the following page(s).

If we can be of further assistance, please contact Cindy Whitten, at (816) 329-2528. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2015-WTE-1855-OE.

Signature Control No: 249768444-271176528 (DNH -WT)
Mike Helvey
Manager, Obstruction Evaluation Group

Attachment(s)
Additional Information
Map(s)

Additional information for ASN 2015-WTE-1855-OE

The proposal was circularized on August 10, 2015, to all known aviation interests and to non-aeronautical interests that may be affected by the proposal. No comments or objections were received.

Proposal: To construct a Wind Turbine to a height of 509 feet above ground level, 509 feet above mean sea level.

Location: The structure will be located 8.8 nautical miles east of the airport reference point for the Ocean City Municipal Airport (26N), Ocean City, NJ.

Part 77 Obstruction Standard(s) Exceeded:

Section 77.17 (a) (1) by 10 feet - a height more than 500 feet above ground level.

Aeronautical study disclosed that the proposed structure would have no effect on existing or proposed arrival, departure, or en route instrument flight rule (IFR) operations or procedures.

The proposed structure would have no effect on any existing or proposed IFR minimum flight altitudes or minimum vectoring altitudes.

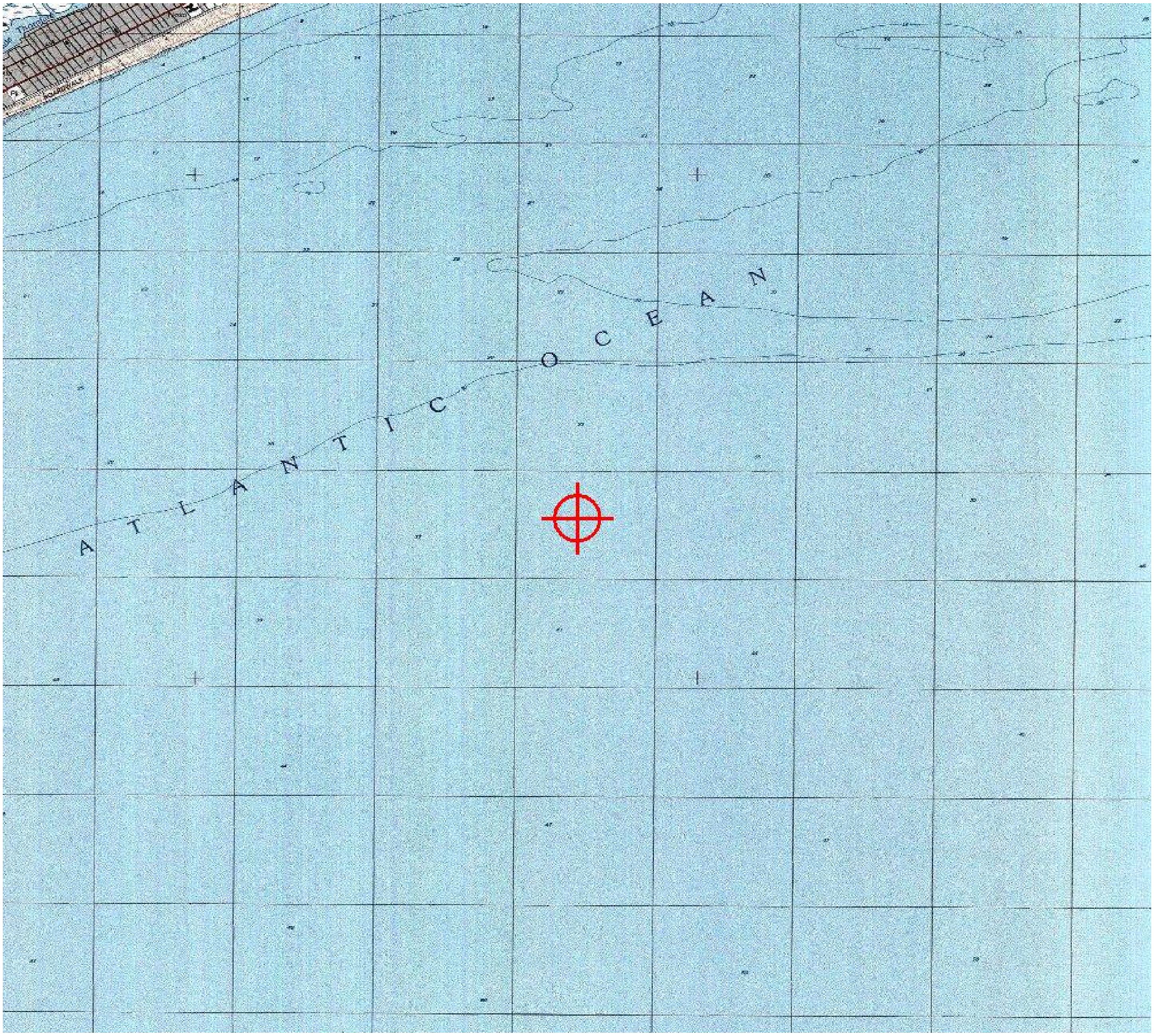
The proposed structure would not penetrate those altitudes normally considered available to airmen for VFR en route flight. The structure would not be located within the traffic pattern airspace; therefore, it will not conflict with airspace required to conduct normal VFR traffic pattern and/or visual approach operations at 26N or any other known public use or military airports.

The proposed structure will be appropriately obstruction lighted with red lights and paint to make it more conspicuous to airmen should circumnavigation be necessary.

The cumulative impact of the proposed structure, when combined with other proposed and existing structures, is not considered to be significant. Study did not disclose any adverse effect on existing or proposed public-use or military airports or navigational facilities, nor would the proposal affect the capacity of any known existing or planned public-use or military airport.

Therefore, it is determined that the proposed structure would not have a substantial adverse effect on the safe and efficient utilization of the navigable airspace by aircraft or on any air navigation facility and would not be a hazard to air navigation providing the conditions set forth in this determination are met.

TOPO Map for ASN 2015-WTE-1855-OE



Sectional Map for ASN 2015-WTE-1855-OE

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2015-WTE-1856-OE

Issued Date: 11/04/2015

Steve O'Malley
Fishermen's Atlantic City Windfarm, LLC
1616 Pacific Avenue
Suite 402
Atlantic City, NJ 08401

** DETERMINATION OF NO HAZARD TO AIR NAVIGATION **

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine Turbine 3
Location:	Atlantic City, NJ
Latitude:	39-18-35.93N NAD 83
Longitude:	74-24-55.59W
Heights:	0 feet site elevation (SE) 509 feet above ground level (AGL) 509 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure would have no substantial adverse effect on the safe and efficient utilization of the navigable airspace by aircraft or on the operation of air navigation facilities. Therefore, pursuant to the authority delegated to me, it is hereby determined that the structure would not be a hazard to air navigation provided the following condition(s) is(are) met:

As a condition to this Determination, the structure is marked/lighted in accordance with FAA Advisory circular 70/7460-1 K Change 2, Obstruction Marking and Lighting, white paint/synchronized red lights - Chapters 4,12&13(Turbines).

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

__X__ At least 10 days prior to start of construction (7460-2, Part 1)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part 2)

See attachment for additional condition(s) or information.

Any height exceeding 509 feet above ground level (509 feet above mean sea level), will result in a substantial adverse effect and would warrant a Determination of Hazard to Air Navigation.

This determination expires on 05/04/2017 unless:

(a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
(b) extended, revised, or terminated by the issuing office.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is subject to review if an interested party files a petition that is received by the FAA on or before December 04, 2015. In the event a petition for review is filed, it must contain a full statement of the basis upon which it is made and be submitted to the Manager, Airspace Policy & Regulation, Federal Aviation Administration, 800 Independence Ave, SW, Room 423, Washington, DC 20591.

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This determination is based, in part, on the foregoing description which includes specific coordinates, heights, frequency(ies) and power. Any changes in coordinates, heights, and frequencies or use of greater power will void this determination. Any future construction or alteration, including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.

Obstruction marking and lighting recommendations for wind turbine farms are based on the scheme for the entire project. ANY change to the height, location or number of turbines within this project will require a reanalysis of the marking and lighting recommendation for the entire project. In particular, the removal of previously planned or built turbines/turbine locations from the project will often result in a change in the marking/lighting recommendation for other turbines within the project. It is the proponent's responsibility to contact the FAA to discuss the process for developing a revised obstruction marking and lighting plan should this occur.

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This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

Any failure or malfunction that lasts more than thirty (30) minutes and affects a top light or flashing obstruction light, regardless of its position, should be reported immediately to (877) 487-6867 so a Notice to Airmen (NOTAM) can be issued. As soon as the normal operation is restored, notify the same number.

This aeronautical study considered and analyzed the impact on existing and proposed arrival, departure, and en route procedures for aircraft operating under both visual flight rules and instrument flight rules; the impact on all existing and planned public-use airports, military airports and aeronautical facilities; and the cumulative impact resulting from the studied structure when combined with the impact of other existing or proposed structures. The study disclosed that the described structure would have no substantial adverse effect on air navigation.

An account of the study findings, aeronautical objections received by the FAA during the study (if any), and the basis for the FAA's decision in this matter can be found on the following page(s).

If we can be of further assistance, please contact Cindy Whitten, at (816) 329-2528. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2015-WTE-1856-OE.

Signature Control No: 249768445-271172971 (DNH -WT)
Mike Helvey
Manager, Obstruction Evaluation Group

Attachment(s)
Additional Information
Map(s)

Additional information for ASN 2015-WTE-1856-OE

The proposal was circularized on August 10, 2015, to all known aviation interests and to non-aeronautical interests that may be affected by the proposal. No comments or objections were received.

Proposal: To construct a Wind Turbine to a height of 509 feet above ground level, 509 feet above mean sea level.

Location: The structure will be located 9.37 nautical miles east of the airport reference point for the Ocean City Municipal Airport (26N), Ocean City, NJ.

Part 77 Obstruction Standard(s) Exceeded:

Section 77.17 (a) (1) by 10 feet - a height more than 500 feet above ground level.

Aeronautical study disclosed that the proposed structure would have no effect on existing or proposed arrival, departure, or en route instrument flight rule (IFR) operations or procedures.

The proposed structure would have no effect on any existing or proposed IFR minimum flight altitudes or minimum vectoring altitudes.

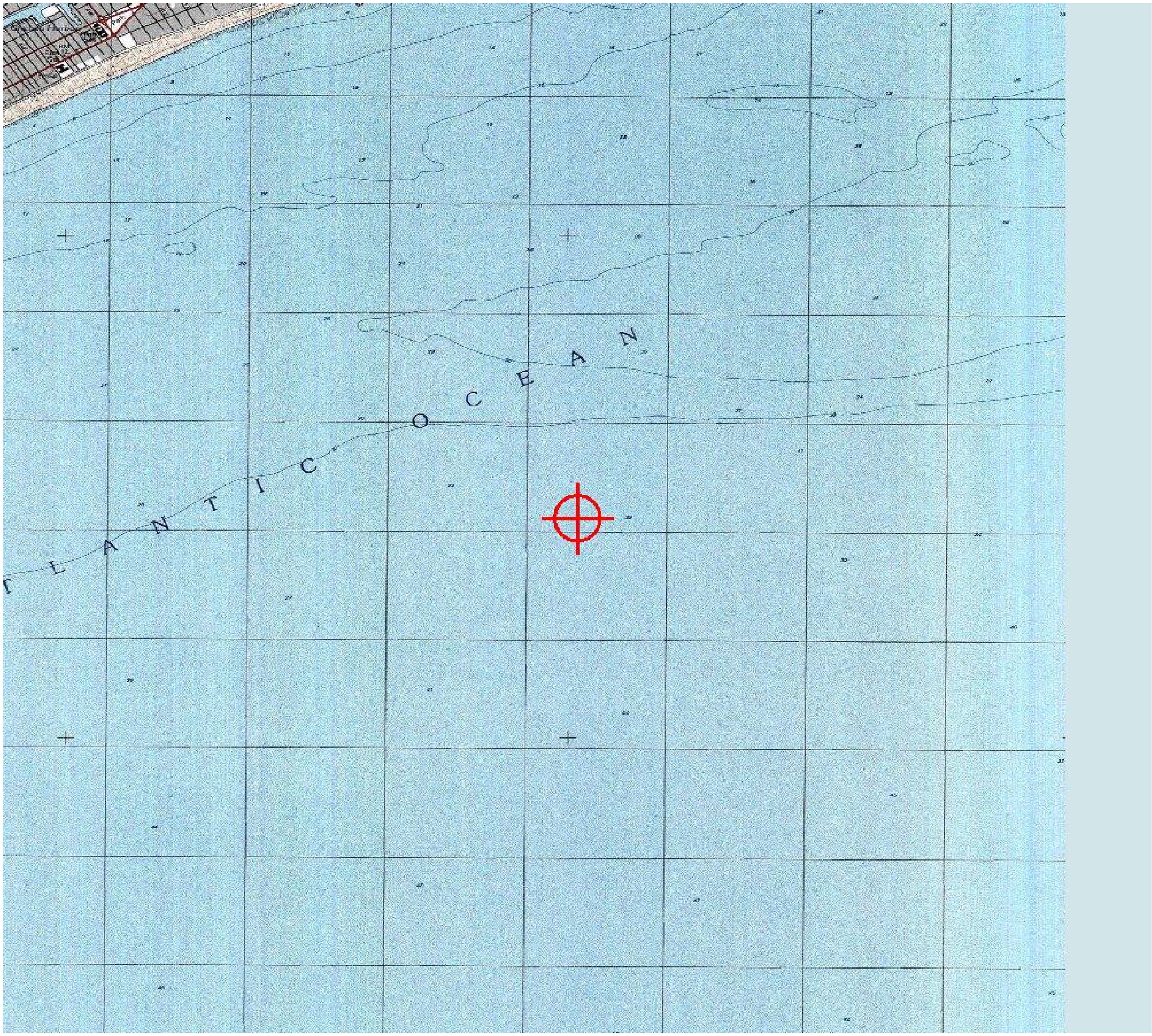
The proposed structure would not penetrate those altitudes normally considered available to airmen for VFR en route flight. The structure would not be located within the traffic pattern airspace; therefore, it will not conflict with airspace required to conduct normal VFR traffic pattern and/or visual approach operations at 26N or any other known public use or military airports.

The proposed structure will be appropriately obstruction lighted with red lights and paint to make it more conspicuous to airmen should circumnavigation be necessary.

The cumulative impact of the proposed structure, when combined with other proposed and existing structures, is not considered to be significant. Study did not disclose any adverse effect on existing or proposed public-use or military airports or navigational facilities, nor would the proposal affect the capacity of any known existing or planned public-use or military airport.

Therefore, it is determined that the proposed structure would not have a substantial adverse effect on the safe and efficient utilization of the navigable airspace by aircraft or on any air navigation facility and would not be a hazard to air navigation providing the conditions set forth in this determination are met.

TOPO Map for ASN 2015-WTE-1856-OE



Sectional Map for ASN 2015-WTE-1856-OE

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2015-WTE-1857-OE

Issued Date: 11/04/2015

Steve O'Malley
Fishermen's Atlantic City Windfarm, LLC
1616 Pacific Avenue
Suite 402
Atlantic City, NJ 08401

** DETERMINATION OF NO HAZARD TO AIR NAVIGATION **

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine Turbine 4
Location:	Atlantic City, NJ
Latitude:	39-18-53.94N NAD 83
Longitude:	74-24-17.01W
Heights:	0 feet site elevation (SE) 509 feet above ground level (AGL) 509 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure would have no substantial adverse effect on the safe and efficient utilization of the navigable airspace by aircraft or on the operation of air navigation facilities. Therefore, pursuant to the authority delegated to me, it is hereby determined that the structure would not be a hazard to air navigation provided the following condition(s) is(are) met:

As a condition to this Determination, the structure is marked/lighted in accordance with FAA Advisory circular 70/7460-1 K Change 2, Obstruction Marking and Lighting, white paint/synchronized red lights - Chapters 4,12&13(Turbines).

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

__X__ At least 10 days prior to start of construction (7460-2, Part 1)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part 2)

See attachment for additional condition(s) or information.

Any height exceeding 509 feet above ground level (509 feet above mean sea level), will result in a substantial adverse effect and would warrant a Determination of Hazard to Air Navigation.

This determination expires on 05/04/2017 unless:

(a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
(b) extended, revised, or terminated by the issuing office.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is subject to review if an interested party files a petition that is received by the FAA on or before December 04, 2015. In the event a petition for review is filed, it must contain a full statement of the basis upon which it is made and be submitted to the Manager, Airspace Policy & Regulation, Federal Aviation Administration, 800 Independence Ave, SW, Room 423, Washington, DC 20591.

This determination becomes final on December 14, 2015 unless a petition is timely filed. In which case, this determination will not become final pending disposition of the petition. Interested parties will be notified of the grant of any review. For any questions regarding your petition, please contact Airspace Regulations & ATC Procedures Group via telephone -- 202-267-8783 - or facsimile 202-267-9328.

This determination is based, in part, on the foregoing description which includes specific coordinates, heights, frequency(ies) and power. Any changes in coordinates, heights, and frequencies or use of greater power will void this determination. Any future construction or alteration, including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.

Obstruction marking and lighting recommendations for wind turbine farms are based on the scheme for the entire project. ANY change to the height, location or number of turbines within this project will require a reanalysis of the marking and lighting recommendation for the entire project. In particular, the removal of previously planned or built turbines/turbine locations from the project will often result in a change in the marking/lighting recommendation for other turbines within the project. It is the proponent's responsibility to contact the FAA to discuss the process for developing a revised obstruction marking and lighting plan should this occur.

In order to ensure proper conspicuity of turbines at night during construction, all turbines should be lit with temporary lighting once they reach a height of 200 feet or greater until such time the permanent lighting configuration is turned on. As the height of the structure continues to increase, the temporary lighting should be relocated to the uppermost part of the structure. The temporary lighting may be turned off for periods when they would interfere with construction personnel. If practical, permanent obstruction lights should be installed and operated at each level as construction progresses. An FAA Type L-810 steady red light fixture shall be used to light the structure during the construction phase. If power is not available, turbines shall be lit with self-contained, solar powered LED steady red light fixture that meets the photometric requirements of an FAA Type L-810 lighting system. The lights should be positioned to ensure that a pilot has an unobstructed view of at least one light at each level. The use of a NOTAM (D) to not light turbines within a project until the entire project has been completed is prohibited.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

Any failure or malfunction that lasts more than thirty (30) minutes and affects a top light or flashing obstruction light, regardless of its position, should be reported immediately to (877) 487-6867 so a Notice to Airmen (NOTAM) can be issued. As soon as the normal operation is restored, notify the same number.

This aeronautical study considered and analyzed the impact on existing and proposed arrival, departure, and en route procedures for aircraft operating under both visual flight rules and instrument flight rules; the impact on all existing and planned public-use airports, military airports and aeronautical facilities; and the cumulative impact resulting from the studied structure when combined with the impact of other existing or proposed structures. The study disclosed that the described structure would have no substantial adverse effect on air navigation.

An account of the study findings, aeronautical objections received by the FAA during the study (if any), and the basis for the FAA's decision in this matter can be found on the following page(s).

If we can be of further assistance, please contact Cindy Whitten, at (816) 329-2528. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2015-WTE-1857-OE.

Signature Control No: 249768446-271176713 (DNH -WT)
Mike Helvey
Manager, Obstruction Evaluation Group

Attachment(s)
Additional Information
Map(s)

Additional information for ASN 2015-WTE-1857-OE

The proposal was circularized on August 10, 2015, to all known aviation interests and to non-aeronautical interests that may be affected by the proposal. No comments or objections were received.

Proposal: To construct a Wind Turbine to a height of 509 feet above ground level, 509 feet above mean sea level.

Location: The structure will be located 9.94 nautical miles east of the airport reference point for the Ocean City Municipal Airport (26N), Ocean City, NJ.

Part 77 Obstruction Standard(s) Exceeded:

Section 77.17 (a) (1) by 10 feet - a height more than 500 feet above ground level.

Aeronautical study disclosed that the proposed structure would have no effect on existing or proposed arrival, departure, or en route instrument flight rule (IFR) operations or procedures.

The proposed structure would have no effect on any existing or proposed IFR minimum flight altitudes or minimum vectoring altitudes.

The proposed structure would not penetrate those altitudes normally considered available to airmen for VFR en route flight. The structure would not be located within the traffic pattern airspace; therefore, it will not conflict with airspace required to conduct normal VFR traffic pattern and/or visual approach operations at 26N or any other known public use or military airports.

The proposed structure will be appropriately obstruction lighted with red lights and paint to make it more conspicuous to airmen should circumnavigation be necessary.

The cumulative impact of the proposed structure, when combined with other proposed and existing structures, is not considered to be significant. Study did not disclose any adverse effect on existing or proposed public-use or military airports or navigational facilities, nor would the proposal affect the capacity of any known existing or planned public-use or military airport.

Therefore, it is determined that the proposed structure would not have a substantial adverse effect on the safe and efficient utilization of the navigable airspace by aircraft or on any air navigation facility and would not be a hazard to air navigation providing the conditions set forth in this determination are met.

TOPO Map for ASN 2015-WTE-1857-OE

Sectional Map for ASN 2015-WTE-1857-OE

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2015-WTE-1858-OE

Issued Date: 11/04/2015

Steve O'Malley
Fishermen's Atlantic City Windfarm, LLC
1616 Pacific Avenue
Suite 402
Atlantic City, NJ 08401

** DETERMINATION OF NO HAZARD TO AIR NAVIGATION **

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine Turbine 5
Location:	Atlantic City, NJ
Latitude:	39-19-11.98N NAD 83
Longitude:	74-23-38.35W
Heights:	0 feet site elevation (SE) 509 feet above ground level (AGL) 509 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure would have no substantial adverse effect on the safe and efficient utilization of the navigable airspace by aircraft or on the operation of air navigation facilities. Therefore, pursuant to the authority delegated to me, it is hereby determined that the structure would not be a hazard to air navigation provided the following condition(s) is(are) met:

As a condition to this Determination, the structure is marked/lighted in accordance with FAA Advisory circular 70/7460-1 K Change 2, Obstruction Marking and Lighting, white paint/synchronized red lights - Chapters 4,12&13(Turbines).

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

__X__ At least 10 days prior to start of construction (7460-2, Part 1)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part 2)

See attachment for additional condition(s) or information.

Any height exceeding 509 feet above ground level (509 feet above mean sea level), will result in a substantial adverse effect and would warrant a Determination of Hazard to Air Navigation.

This determination expires on 05/04/2017 unless:

(a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
(b) extended, revised, or terminated by the issuing office.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is subject to review if an interested party files a petition that is received by the FAA on or before December 04, 2015. In the event a petition for review is filed, it must contain a full statement of the basis upon which it is made and be submitted to the Manager, Airspace Policy & Regulation, Federal Aviation Administration, 800 Independence Ave, SW, Room 423, Washington, DC 20591.

This determination becomes final on December 14, 2015 unless a petition is timely filed. In which case, this determination will not become final pending disposition of the petition. Interested parties will be notified of the grant of any review. For any questions regarding your petition, please contact Airspace Regulations & ATC Procedures Group via telephone -- 202-267-8783 - or facsimile 202-267-9328.

This determination is based, in part, on the foregoing description which includes specific coordinates, heights, frequency(ies) and power. Any changes in coordinates, heights, and frequencies or use of greater power will void this determination. Any future construction or alteration, including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.

Obstruction marking and lighting recommendations for wind turbine farms are based on the scheme for the entire project. ANY change to the height, location or number of turbines within this project will require a reanalysis of the marking and lighting recommendation for the entire project. In particular, the removal of previously planned or built turbines/turbine locations from the project will often result in a change in the marking/lighting recommendation for other turbines within the project. It is the proponent's responsibility to contact the FAA to discuss the process for developing a revised obstruction marking and lighting plan should this occur.

In order to ensure proper conspicuity of turbines at night during construction, all turbines should be lit with temporary lighting once they reach a height of 200 feet or greater until such time the permanent lighting configuration is turned on. As the height of the structure continues to increase, the temporary lighting should be relocated to the uppermost part of the structure. The temporary lighting may be turned off for periods when they would interfere with construction personnel. If practical, permanent obstruction lights should be installed and operated at each level as construction progresses. An FAA Type L-810 steady red light fixture shall be used to light the structure during the construction phase. If power is not available, turbines shall be lit with self-contained, solar powered LED steady red light fixture that meets the photometric requirements of an FAA Type L-810 lighting system. The lights should be positioned to ensure that a pilot has an unobstructed view of at least one light at each level. The use of a NOTAM (D) to not light turbines within a project until the entire project has been completed is prohibited.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

Any failure or malfunction that lasts more than thirty (30) minutes and affects a top light or flashing obstruction light, regardless of its position, should be reported immediately to (877) 487-6867 so a Notice to Airmen (NOTAM) can be issued. As soon as the normal operation is restored, notify the same number.

This aeronautical study considered and analyzed the impact on existing and proposed arrival, departure, and en route procedures for aircraft operating under both visual flight rules and instrument flight rules; the impact on all existing and planned public-use airports, military airports and aeronautical facilities; and the cumulative impact resulting from the studied structure when combined with the impact of other existing or proposed structures. The study disclosed that the described structure would have no substantial adverse effect on air navigation.

An account of the study findings, aeronautical objections received by the FAA during the study (if any), and the basis for the FAA's decision in this matter can be found on the following page(s).

If we can be of further assistance, please contact Cindy Whitten, at (816) 329-2528. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2015-WTE-1858-OE.

Signature Control No: 249768447-271176902 (DNH -WT)
Mike Helvey
Manager, Obstruction Evaluation Group

Attachment(s)
Additional Information
Map(s)

Additional information for ASN 2015-WTE-1858-OE

The proposal was circularized on August 10, 2015, to all known aviation interests and to non-aeronautical interests that may be affected by the proposal. No comments or objections were received.

Proposal: To construct a Wind Turbine to a height of 509 feet above ground level, 509 feet above mean sea level.

Location: The structure will be located 10.51 nautical miles east of the airport reference point for the Ocean City Municipal Airport (26N), Ocean City, NJ.

Part 77 Obstruction Standard(s) Exceeded:

Section 77.17 (a) (1) by 10 feet - a height more than 500 feet above ground level.

Aeronautical study disclosed that the proposed structure would have no effect on existing or proposed arrival, departure, or en route instrument flight rule (IFR) operations or procedures.

The proposed structure would have no effect on any existing or proposed IFR minimum flight altitudes or minimum vectoring altitudes.

The proposed structure would not penetrate those altitudes normally considered available to airmen for VFR en route flight. The structure would not be located within the traffic pattern airspace; therefore, it will not conflict with airspace required to conduct normal VFR traffic pattern and/or visual approach operations at 26N or any other known public use or military airports.

The proposed structure will be appropriately obstruction lighted with red lights and paint to make it more conspicuous to airmen should circumnavigation be necessary.

The cumulative impact of the proposed structure, when combined with other proposed and existing structures, is not considered to be significant. Study did not disclose any adverse effect on existing or proposed public-use or military airports or navigational facilities, nor would the proposal affect the capacity of any known existing or planned public-use or military airport.

Therefore, it is determined that the proposed structure would not have a substantial adverse effect on the safe and efficient utilization of the navigable airspace by aircraft or on any air navigation facility and would not be a hazard to air navigation providing the conditions set forth in this determination are met.

TOPO Map for ASN 2015-WTE-1858-OE

Sectional Map for ASN 2015-WTE-1858-OE

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2015-WTE-1859-OE

Issued Date: 11/04/2015

Steve O'Malley
Fishermen's Atlantic City Windfarm, LLC
1616 Pacific Avenue
Suite 402
Atlantic City, NJ 08401

** DETERMINATION OF NO HAZARD TO AIR NAVIGATION **

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine Turbine 6
Location:	Atlantic City, NJ
Latitude:	39-19-30.05N NAD 83
Longitude:	74-22-59.61W
Heights:	0 feet site elevation (SE) 509 feet above ground level (AGL) 509 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure would have no substantial adverse effect on the safe and efficient utilization of the navigable airspace by aircraft or on the operation of air navigation facilities. Therefore, pursuant to the authority delegated to me, it is hereby determined that the structure would not be a hazard to air navigation provided the following condition(s) is(are) met:

As a condition to this Determination, the structure is marked/lighted in accordance with FAA Advisory circular 70/7460-1 K Change 2, Obstruction Marking and Lighting, white paint/synchronized red lights - Chapters 4,12&13(Turbines).

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

__X__ At least 10 days prior to start of construction (7460-2, Part 1)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part 2)

See attachment for additional condition(s) or information.

Any height exceeding 509 feet above ground level (509 feet above mean sea level), will result in a substantial adverse effect and would warrant a Determination of Hazard to Air Navigation.

This determination expires on 05/04/2017 unless:

(a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
(b) extended, revised, or terminated by the issuing office.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is subject to review if an interested party files a petition that is received by the FAA on or before December 04, 2015. In the event a petition for review is filed, it must contain a full statement of the basis upon which it is made and be submitted to the Manager, Airspace Policy & Regulation, Federal Aviation Administration, 800 Independence Ave, SW, Room 423, Washington, DC 20591.

This determination becomes final on December 14, 2015 unless a petition is timely filed. In which case, this determination will not become final pending disposition of the petition. Interested parties will be notified of the grant of any review. For any questions regarding your petition, please contact Airspace Regulations & ATC Procedures Group via telephone -- 202-267-8783 - or facsimile 202-267-9328.

This determination is based, in part, on the foregoing description which includes specific coordinates, heights, frequency(ies) and power. Any changes in coordinates, heights, and frequencies or use of greater power will void this determination. Any future construction or alteration, including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.

Obstruction marking and lighting recommendations for wind turbine farms are based on the scheme for the entire project. ANY change to the height, location or number of turbines within this project will require a reanalysis of the marking and lighting recommendation for the entire project. In particular, the removal of previously planned or built turbines/turbine locations from the project will often result in a change in the marking/lighting recommendation for other turbines within the project. It is the proponent's responsibility to contact the FAA to discuss the process for developing a revised obstruction marking and lighting plan should this occur.

In order to ensure proper conspicuity of turbines at night during construction, all turbines should be lit with temporary lighting once they reach a height of 200 feet or greater until such time the permanent lighting configuration is turned on. As the height of the structure continues to increase, the temporary lighting should be relocated to the uppermost part of the structure. The temporary lighting may be turned off for periods when they would interfere with construction personnel. If practical, permanent obstruction lights should be installed and operated at each level as construction progresses. An FAA Type L-810 steady red light fixture shall be used to light the structure during the construction phase. If power is not available, turbines shall be lit with self-contained, solar powered LED steady red light fixture that meets the photometric requirements of an FAA Type L-810 lighting system. The lights should be positioned to ensure that a pilot has an unobstructed view of at least one light at each level. The use of a NOTAM (D) to not light turbines within a project until the entire project has been completed is prohibited.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

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This aeronautical study considered and analyzed the impact on existing and proposed arrival, departure, and en route procedures for aircraft operating under both visual flight rules and instrument flight rules; the impact on all existing and planned public-use airports, military airports and aeronautical facilities; and the cumulative impact resulting from the studied structure when combined with the impact of other existing or proposed structures. The study disclosed that the described structure would have no substantial adverse effect on air navigation.

An account of the study findings, aeronautical objections received by the FAA during the study (if any), and the basis for the FAA's decision in this matter can be found on the following page(s).

If we can be of further assistance, please contact Cindy Whitten, at (816) 329-2528. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2015-WTE-1859-OE.

Signature Control No: 249768448-271177104 (DNH -WT)
Mike Helvey
Manager, Obstruction Evaluation Group

Attachment(s)
Additional Information
Map(s)

Additional information for ASN 2015-WTE-1859-OE

The proposal was circularized on August 10, 2015, to all known aviation interests and to non-aeronautical interests that may be affected by the proposal. No comments or objections were received.

Proposal: To construct a Wind Turbine to a height of 509 feet above ground level, 509 feet above mean sea level.

Location: The structure will be located 11.08 nautical miles east of the airport reference point for the Ocean City Municipal Airport (26N), Ocean City, NJ.

Part 77 Obstruction Standard(s) Exceeded:

Section 77.17 (a) (1) by 10 feet - a height more than 500 feet above ground level.

Aeronautical study disclosed that the proposed structure would have no effect on existing or proposed arrival, departure, or en route instrument flight rule (IFR) operations or procedures.

The proposed structure would have no effect on any existing or proposed IFR minimum flight altitudes or minimum vectoring altitudes.

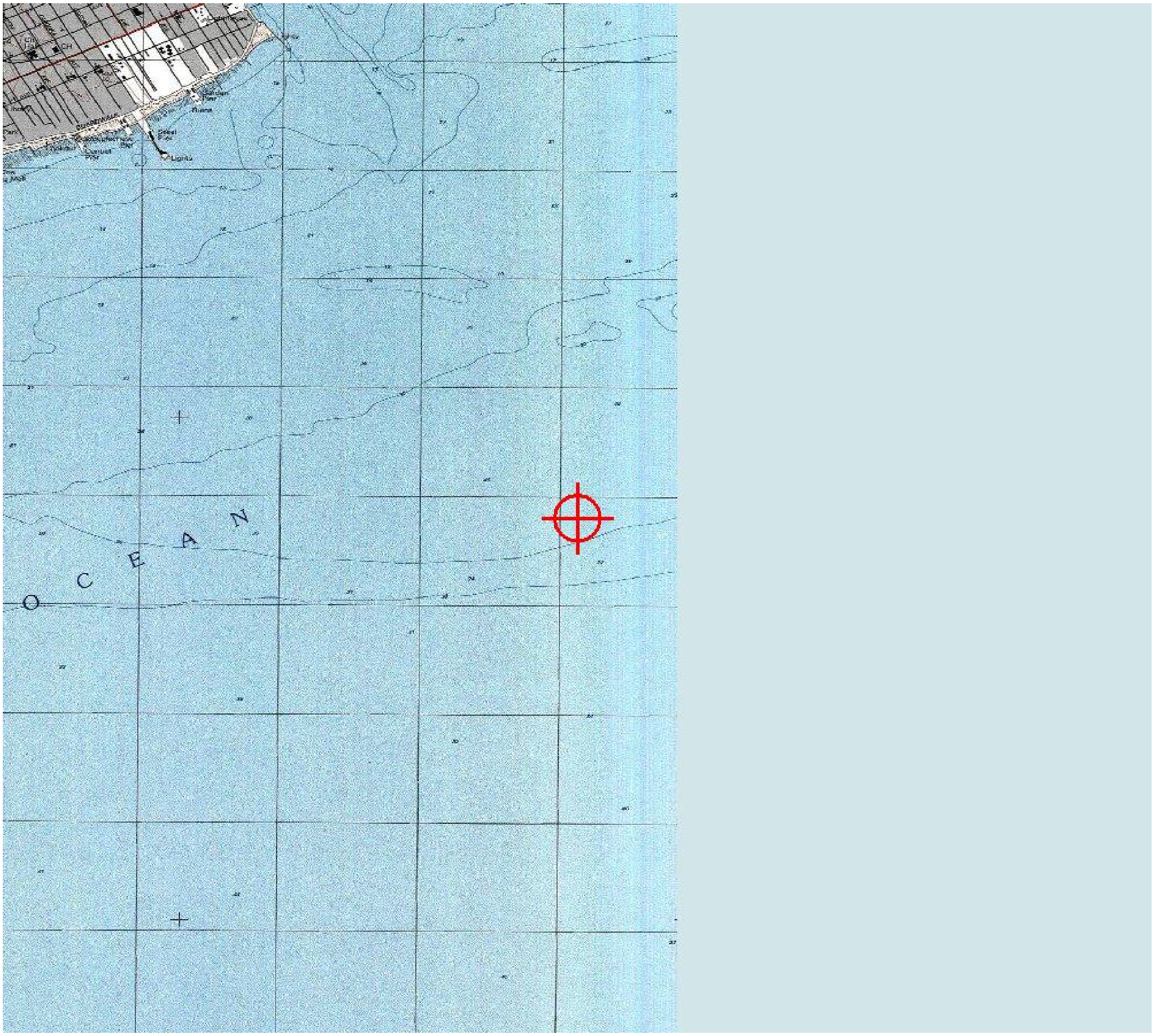
The proposed structure would not penetrate those altitudes normally considered available to airmen for VFR en route flight. The structure would not be located within the traffic pattern airspace; therefore, it will not conflict with airspace required to conduct normal VFR traffic pattern and/or visual approach operations at 26N or any other known public use or military airports.

The proposed structure will be appropriately obstruction lighted with red lights and paint to make it more conspicuous to airmen should circumnavigation be necessary.

The cumulative impact of the proposed structure, when combined with other proposed and existing structures, is not considered to be significant. Study did not disclose any adverse effect on existing or proposed public-use or military airports or navigational facilities, nor would the proposal affect the capacity of any known existing or planned public-use or military airport.

Therefore, it is determined that the proposed structure would not have a substantial adverse effect on the safe and efficient utilization of the navigable airspace by aircraft or on any air navigation facility and would not be a hazard to air navigation providing the conditions set forth in this determination are met.

TOPO Map for ASN 2015-WTE-1859-OE



Sectional Map for ASN 2015-WTE-1859-OE

HPO Project # 10-1023-7
HPO-L2015-066
Page 1 of 2

State of New Jersey
MAIL CODE 501-04B
DEPARTMENT OF ENVIRONMENTAL PROTECTION
NATURAL & HISTORIC RESOURCES
HISTORIC PRESERVATION OFFICE
P.O. Box 420
Trenton, NJ 08625-0420
TEL. (609) 984-0176 FAX (609) 984-0578

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

December 8, 2015

Lori Gray
NEPA Division Director
Department of Energy
Golden Field Office
15013 Denver West Parkway
Golden, Colorado 80401

Dear Ms. Gray:

As Deputy State Historic Preservation Officer for New Jersey, in accordance with 36 CFR Part 800: Protection of Historic Properties, as published in the *Federal Register* on December 12, 2000 (65 FR 77725-77739) and amended on July 6, 2004 (69 FR 40544-40555), I am providing Consultation Comments for the following proposed undertaking:

Atlantic County, Atlantic City
Proposed Construction of Six Wind Turbine Generators
Fisherman's Atlantic City Windfarm, LLC
United States Department of Energy

800.5 Assessment if Adverse Effects

Thank you for providing the Historic Preservation Office (HPO) with the opportunity to review and comment on the electronic correspondence of Mr. Richard Helfant, Executive Director and CEO of Lucy the Elephant National Historic Landmark, which was received by the HPO on September 4, 2015. This documentation was requested by our office in our letter of July 15, 2015 (G2015-178) as part of Section 106 consultation.

According to Mr. Helfant's letter, as a consulting party, he felt that there would be no impact on Lucy the Elephant, which was given National Historic Landmark status on May 11, 1976. Although the turbines will be visible from Lucy and other historic properties, the small nature of this particular windfarm and previous visual intrusions in the vicinity will not affect their integrity. Based upon Mr. Helfant's comments and the HPO's previous review of the revised viewshed analysis, which was addressed in my July 15 letter, I find that there will be **no adverse effect** to historic properties by the Fishermen's Atlantic City Windfarm project. Consequently, pursuant to 800.5(c), if no consulting parties object to this finding within the 30 day review period, the project may proceed, as proposed, unless resources are discovered during project implementation, pursuant to 800.13.

Additional Comments

Thank you for providing both the HPO and consulting parties with the opportunity for review and comment on the potential for the above-referenced project to affect historic properties. Please reference the HPO project number 10-1023, in any future calls, emails, or written correspondence to help expedite your review and response. Please do not hesitate to contact Jesse West-Rosenthal (609-984-6019) of my staff with questions regarding archaeology.

Sincerely,

/Km

Daniel D. Saunders
Deputy State Historic
Preservation Officer

Cc: Nicole Minnichbach - USACE
Janet Stewart – NJDEP, DLUR
Richard Helfant – Lucy

DDS/MC/JWR

APPENDIX D

PUBLIC COMMENTS

This Notice of Availability was published in the press of Atlantic City Newspaper on March 5, 2015, March 6, 2015 and March 8, 2015.

NOTICE OF AVAILABILITY

The U.S. Department of Energy (DOE), in compliance with the National Environmental Policy Act of 1969 (NEPA), has prepared a draft Environmental Assessment (EA) (DOE/EA 1970) to analyze and describe the potential environmental impacts associated with providing funding to Fishermen's Atlantic City Windfarm, LLC to support the development of an offshore wind renewable energy facility within New Jersey State Waters located 2.8 miles off the New Jersey coast from Atlantic City. The proposed project consists of up to six wind turbine generators that would generate about 25 megawatts of electricity and the necessary electrical transmission facilities to connect to an existing substation.

You are invited to submit written comments on the draft EA. All comments will be considered in preparation of the final EA. The draft EA is available for review at:

www.energy.gov/node/1019606

The DOE Golden Field Office welcomes your input throughout the NEPA Process. Please direct any written questions or comments to:

U.S. Department of Energy
Golden Field Office
NEPA Division
15013 Denver West Parkway
Golden, Colorado 80401

by email to gonepa@ee.doe.gov or by fax to 720-356-1350. Comments must be received by April 3, 2015.

In addition, you are invited to attend an informational meeting from 4 p.m. to 7 p.m. on March 10, 2015 at The Carnegie Center (Room 206), 35 S. Dr. MLK, Jr. Blvd., Atlantic City, NJ 08401.

Comment Response Matrix for Public Comments on the
Draft Environmental Assessment for Fishermen's Atlantic City Windfarm

Comment Number	Section Number	Original Page Number	Comment	Commenter	Response
1	Socioeconomics		The BPU has twice rejected the application to create a field of wind turbines off the shore of Atlantic City. They have expressed their concern that it would cause a large increase in cost to the consumer for their energy. The Federal Government would support this project by loans and subsidies. how long would this support last? As with any government project this type of subsidy is a subject to change at any time.	E. Steele, C. Steele	Comment noted. Please see Section 1.1, *National Environmental Policy Act* and Section 1.2, *Background* for a history of the proposed project related to the cost of energy. and for information on the DOE Funding Opportunity Announcement FOA-0000410 US Offshore Wind: Advanced Technology Demonstration. The purpose of the Advanced Technology Demonstration Projects is to verify innovative designs and technology developments and validate full performance and cost under real operating and market conditions.
2	Socioeconomics		We have high cost for electricity in Atlantic City and through out the state. I really do not want to have to pay more for the energy that we receive. As a senior citizen the cost of living in New Jersey has greatly increased in the time that we have been living here. The Federal Government tells us that the great recession is no more and that the nation is growing and jobs are plentiful. Where? Not here in New Jersey and not in Atlantic City where many people are still out of work and taxes have been raised 52% in the past 2 years.	E. Steele, C. Steele	Comment noted. See response to Comment #4. For an analysis of the effects on curtailment on energy prices, please see Section 3.6.2., *Environmental Impacts Related to Socioeconomics.* The Proposed Project could either increase tourism into the Atlantic City area by adding an additional sight-seeing locale, or retain tourists already within Atlantic City for a longer duration of time.
3	Utilities Socioeconomics		I can see no compelling need for a project that does not produce affordable energy. You have made no affordability analysis. You should not have wasted the time on the environmental assessment. This project is un-buildable. Talk about throwing money into a hole in the water. This group claims to make more money on tourism than on production of energy.	T. Fritz	Comment noted. Please see response to Comment #4. The purpose of the Advanced Technology Demonstration Projects is to verify innovative designs and technology developments and validate full performance and cost under real operating and market conditions.
4	Visual Resources		I write in protest of the proposed development of an offshore wind renewable energy facility along the coast of Atlantic City. Each morning I look out at the magnificence of the ocean. I behold the beauty and the vast nature of the never ending tidal forces. The last thing I want to see is a farm of windmills souring the horizon. I'm sure environmentalists are all for renewable energy, but I also thought they want to preserve the wilds, the forest, the natural beauty of world around us. To that end, there couldn't be a more disruptive blot on our wonder of the world we call the ocean. Please do not fund this project.	R. Fleisher	Comment noted. For an analysis of the effects on visual resources, please refer to Section 3.5, *Cultural Resources* . Based upon the photographs generated with the overlying depiction of the turbines and their respective size and location in relation to the historically sensitive areas investigated as a part of the viewshed analysis the turbines in the horizon would appear as structures that would be much smaller in comparison to surrounding structures on land.
5	General		Based on our review of the draft EA, we do not anticipate that the proposed FACW would result in significant adverse environmental impacts.	G. Musumeci (USEPA)	Comment noted.
6	Air Quality	3-16	For nitrogen oxides (NOx), the emissions shown in the general conformity section of the EA (starting on page 3-16) are less than half of the values in the general conformity report in the Appendix (page 177) with no explanation for the difference. The assumptions seem to be the same between the two sections. Please update the appendix and/or provide new data to justify the differences.	G. Musumeci (USEPA)	Comment noted. The emissions presented in the draft appendix reflect an earlier analysis conducted prior to changes in the construction method and schedule. Section 3 of the EA has been revised and updated emissions tables have been added to the Air Quality appendix. All assumptions in Section 3 regarding equipment types, sizes and activity factors remain the same.

Comment Number	Section Number	Original Page Number	Comment	Commenter	Response
7	Air Quality		The assumption to use Tier 3 nonroad engines to represent a blend of Tier 2 and Tier 4 engines is not valid. The Tier 3 and Tier 4 NOx standards are identical, while the Tier 3 and Tier 4 particulate matter (PM) standards are not. However, going from Tier 2 to Tier 3 lowers the NOx standard with PM remaining the same. Therefore, using Tier 3 to represent a combination of Tiers 2 and 4 will lead to an underestimation of NOx and overestimation of PM. EPA estimates that the additional extra tons of NOx are not going to cause the project to exceed de minimis, but this assumption should still be addressed by the DOE.	G. Musumeci (USEPA)	Comment noted. Emissions calculations from nonroad equipment using NONROAD2008 were revised to reflect a worst case methodology. In the case of NOx, emissions were revised to reflect Tier 2 factors for all nonroad equipment. PM2.5 and PM10 continue to be based on Tier 3 factor since the Tier 3 PM2.5 and PM10 factors reflect a more conservative estimate than Tier 2. THC (VOC), CO and SO2 emissions still reflect the Tier 3 factors previously used as there is minimal difference between the two for the project equipment. Based on the revised emissions presented in Attachment 1, the project is not subject to the General Conformity provisions and a Record of Non Applicability (RONA) can be issued by DOE.
8	Air Quality		The on-road portion of the analysis is based on Mobile6.2. Please note that EPA's MOVES is the currently-approved on-road mobile source emissions model for conformity purposes.	G. Musumeci (USEPA)	Comment noted. Mobile source emissions for on-road sources were revised using MOVES2010 for all pollutants, including GHGs. MOVES was run using four vehicle types and four road types. In addition to the vehicle and road types, MOVES also calculates emissions by 16 speed bins reflecting travel speeds of 2.5 miles per hour to 75 miles per hour, with the highest emissions occurring at the lowest travel speed. Due to the large size of the MOVES output, July was selected to reflect the maximum volatile emission rates. As a conservative estimate, the maximum criteria pollutant emission factors for all days, hours, road types, and all vehicle types for speed bin 1 (<2.5 mph) were used to estimate the mobile source criteria pollutant emissions from project construction for comparison to conformity thresholds. This is very conservative since the NJDEP permit for the project limits idling to no more than three minutes. A summary of the worst case MOVES emission factors are provided in Attachment 2. For CO2e, an average of the worst case emission factors over all vehicle and road types was used to estimate emissions. The average is 6,268 grams per mile over all speed classes. Again, based on the revised emissions, the project is not subject to the General Conformity provisions and a RONA can be issued by DOE.
9	Air Quality/ Greenhouse Gases		On December 18, 2014, CEQ released revised draft guidance for public comment that describes how Federal departments and agencies should consider the effects of greenhouse gas (GHG) emissions and climate change in their NEPA reviews. The revised draft guidance supersedes the draft greenhouse gas and climate change guidance released by CEQ in February 2010. The 2014 Guidance states that Agencies should consider the following when addressing climate change: (1) the potential effects of a proposed action on climate change as indicated by its GHG emissions; and (2) the implications of climate change for the environmental effects of a proposed action.	G. Musumeci (USEPA)	Comment noted. The GHG analysis presented in the EA had been conducted prior to the December 2014 CEQ guidance and was based on an earlier 2010 CEQ draft of the guidance. To address comments received from U.S. EPA Region 2 concerning the analysis presented in the draft EA, GHG emissions from the construction and operation of the FACW offshore wind farm were evaluated using the December 2014 CEQ guidance. To comply with the CEQ draft December 2014 GHG emissions guidelines, anticipated GHG emissions from the construction and operation of the project were evaluated. In addition, GHG emissions reductions from displacing combustion generated electricity with wind generated electricity were quantified to assess the action versus no action alternative on GHG emissions.
10	Project Description		Regarding the location of the wind turbines on identified sand shoals: this matter was addressed in the previous proposal. The current proposals maintains the 250-foot buffer around the proposed cable route in the borrow areas.	J. Uptegrove (NJGWS, NJDEP)	Comment noted. This buffer size was agreed to with USCOE in 2010 to provide a buffer along the cable route to prevent dredging of the cable. No change to the EA.

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11	Project Description		The Description Document states: "Engineering analyses have determined that the base of each foundation will no longer require a scour protection mat or rock scour protection around each foundation pile." If it is not included, that would be a significant decrease in disturbance of the seafloor, as long as the foundation piles did not create a current environment that would promote sediment scouring. Please discuss in more detail.	J. Uptegrove (NJGWS, NJDEP)	The majority of offshore oil & gas structures are jackets: four or more legged structures. Because their main transfer of forces is through axial loading of the legs, scouring will not have large effects on jacket-type foundations. The recommendation for no scour protection comes from our foundation designer, Keystone Engineering. Keystone states that because of the relatively small piling diameters, sediment grain size, and low velocity currents at the site, the conditions are not conducive to scour. Local, small scale scour pockets may develop and then be quickly filled in by natural processes. No change to EA.
12	Project Description / Geological Resources		Regarding the foundation of turbines: requires that four 84-inch-diameter piles are driven approximately 150 feet below the mudline (water bottom). Previous design required eighteen 48-inch-diameter piles driven into openings on the three ends of the foundation structure. I believe the former design did not drive the piles as deep. Will driving deeper require a stronger motor or pile-driving tool? Can the developer include a discussion of how the piles will be anchored in the sediment, and whether this style of foundation needs a certain sediment type or texture for stability? Have engineering properties been tested on sediments from the borings? Is there past experience with this foundation design from other projects that can be cited as evidence or as a construction model, to help with evaluating the proposal?	J. Uptegrove (NJGWS, NJDEP)	Comment noted. The original Multiple Permit Application indicated the monopiles would be driven to a depth of 150 feet below the mud line, a depth which was already permitted. The same as what is proposed for the IBGS. Further, the IBGS would require a smaller hydraulic or vibratory hammer compared to the originally permitted monopile foundation. A discussion of anchoring has been added to the EA.The geometry of the IBGS foundation design transfers the sideways forces on the turbines (from the wind) along the sloped legs and into the seafloor, so that the soil is “more efficient” in supporting the structure and turbine above. Most soils are inherently better in axial capacity than lateral capacity. A total of four (4) drilled soil borings, seven (7) Cone Penetration Test Probes (CPT), and 16 vibracores were performed at the six (6) proposed turbine locations, and along the proposed undersea transmission cable route. Soil borings and CPT probes were utilized to identify subsurface conditions, and to determine strength and deformation characteristics of the encountered soils for use in monopole foundation design. Vibracores were collected to allow the archeological study of near surface sediments by others, and to obtain soil thermal and electrical properties for cable design. This structure design has been used to support two oil and gas platforms in the Gulf of Mexico. The initial foundation withstood hurricane Katrina, a 400-year return period ocean condition with no damage, proving the inherent robustness of the foundation. In October 2011, the Hornsea Met Mast foundation was installed in UK Round 3 waters to support a meteorological mast, which proved the installation techniques in North Sea conditions. Push-over analysis has shown that the structure has reserve strength ratio (RSR) slightly greater than a typical four-pile jacket.
13	Project Description / Geological Resources		Are there geotechnical surveys that were conducted by the developer to determine what materials they should be drilling in the excavation/installation of the cable and the pile driving of the foundations of the turbines? Can that information or a link to that study be footnoted in the Description Document or a Summary Document? This is of some concern due to what I think must be the deeper driving of the three piles into the subsurface in the IBGS foundation design compared to the shallower pile driving for the original monopole foundation proposal. Can the developer address that change in the Description Document?	J. Uptegrove (NJGWS, NJDEP)	Yes. Please see response to Comment #16.

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14	Project Description	6	I believe that the HDD method of excavating and installing cable is new to this proposal. This section of the Description Document appears to have some conflicting statements. Specifically, the penultimate sentence of the top paragraph of p. 6 appears to conflict with the depth description for the rest of the onshore cable running to the Huron sub-station. The result is that it is not clear if the depth is 20 feet or 25 feet. Perhaps this part of the plan could be explained in more detail in the Description Document, as it is a change from the previo0us plan, as I understand it.	J. Uptegrove (NJGWS, NJDEP)	Comment noted. HDD has always been the method of choice for installing the underground cable from a point just offshore to the Huron sub-station. The only thing that changed was the point (distance offshore) at which jet plowing switched over to HDD for installation of upland cable. The upland cable depth has not changed as the final depth has not been determined yet. It will be determined by the HDD operator based on existing conditions. It will most likely be between 20 and 25 feet deep but it is not certain at this time.
15	Project Description	2-10	Re: the cables, there is a footnote cited in that part of the document that states that the Horizontal Directional Drilling (HDD) method will be used to install excavate and install the onshore section of the cable, and extend as far offshore as 1800 feet (water depth of about 12 feet), where it will be concerted from a PVC tube-protected cable to a cable that rests in a trench that has been jet-plowed and buried to a "target" depth of 6 feet below the seafloor. However, there is no footnote corresponding to the citation in the text with a superscript, 16. The note is in the Draft EA, p. 2-10, footnote 2. That information is needed (perhaps with a reference to where in the proposal the HDD method is explained in more detail). It would be helpful to have this revised method described in greater detail in an Appendix or other associated document.	J. Uptegrove (NJGWS, NJDEP)	Comment noted. Footnote “16” is erroneous. The footnote information from the EA which says “HDD is a steerable trenchless method of installing underground pipes, conduits and cables in a shallow arc along a prescribed bore path by using a surface-launched drilling rig, with minimal impact on the surrounding area” is accurate. However, additional details are required as HDD has already been permitted and is not a new method being used for the project.
16	Project Description / Geological Resources		On the outboard end, the buried cable depth is changed from 9 feet to 6 feet. This change in the depth of the cable is beyond the expertise of The New Jersey Geological and Water Survey (NJGWS); however, if it is buried 3 feet closer to the seafloor, then there may be increased risk of excavation by marine currents which are active in the nearshore. There may be someone who oversees the transatlantic cables originating in New Jersey who can provide expert review of this design and changed burial depth.	J. Uptegrove (NJGWS, NJDEP)	Comment noted. Additional detail added regarding results following Hurricane Sandy. Analysis of the pre- and post-Sandy surveys indicates that only minor erosion or accretion of sediments, in the range of 0.10 meter (0.3 feet), occurred along the 2.8 mile cable route between Turbine #3 and the shore landing. Survey conclusions also indicate that there was very little change in the in bathymetry throughout the majority of the turbine / foundation areas. Study of the shoal area on the eastern end of the turbine array did indicate scour. However, as this area is used by the USACE as a sand borrow area, it is not clear if the change is storm related, or due to dredging activity. Based on this information, FISHERMEN’S maintains that a 6 foot burial depth in the environment in which the wind farm will be installed is more than sufficient to ensure the protection of the cable from exposure from major storm event.
17	Project Description		Similarly, the cable diameter has decreased from 8 inches to 5 inches. As I understand it, this change will not result in increased disturbance to the subsurface.	J. Uptegrove (NJGWS, NJDEP)	Comment noted. The cable diameter has decreased; however, no change to environmental impacts are anticipated.
18	Project Description		Is there a section in the Draft EA or more that could be included in the Description Document, or an additional figure included that depicts the connection point of the turbine cables with the main export cable? This is challenging to visualize, and leaves some doubt about the safety and durability of the interconnection and its protection against excavation by marine currents.	J. Uptegrove (NJGWS, NJDEP)	Comment noted. Description added to assist in visualization.

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19	Project Description		The burial depth of the onshore-to-1,800-feet-offshore, PVC-protected cable is shown at a maximum of 27 feet below mean high water at station 14 to 15 on Drawing C-2. Is there a reason why the cable dips so low and then has to shallow to the depth of 6 feet below sea floor of the jet-plow/burial section of the cable? Is there a reason why the depth is not more uniform?	J. Uptegrove (NJGWS, NJDEP)	Comment noted. This is the transition point from jet-plowing to HDD technology. The offshore cable (installed using jet plowing) need only be buried to 6 feet below the sediment surface while the onshore cable (installed via HDD) needs to be deeper below ground. The “dip” is the cable being submerged from 6 feet to the required depth for the HDD installation, determined by the HDD operator based on existing conditions.
20	Project Description		Related question: What is considered a "safe" and/or non-intrusive standard burial depth of subsurface marine cables? It would be better if the document could state or refer the reviewer to parts of the EA in which the existing technology or guidelines are cited, such that one can evaluate what previous experience has been, and what the current expertise is. Maybe this was addressed in the original proposal.	J. Uptegrove (NJGWS, NJDEP)	Comment noted. As per the Coastal Zone Management Act Rule Regarding Submerged cables at 7:7E-4.20(c)2, a submerged cable shall be buried to a depth of at least 1.2 meters both in surf clam areas, and in areas where marine fish are commercially harvested. Fishermen’s proposed depth of 6 feet is 0.6 meters deeper than required for this Special Area.
21	Project Description		Also because of the introduction of the HDD technology to this project, additional description/explanation of the interconnection between the PVC-encased cable and the non-encased section would be helpful.	J. Uptegrove (NJGWS, NJDEP)	Please see response to Comment #20. HDD technology was already permitted in the original application.
22	Project Description		Regarding the Operations and Maintenance Plan, inspections of the underwater structures and seabed will be performed by "personnel qualified by the manufacturer", at a minimum of once per year. Is there a regulatory body that will oversee or review these inspections? To whom will the results be reported? Is there an oversight mechanism in place, perhaps from already existing onshore wind turbine regulation?	J. Uptegrove (NJGWS, NJDEP)	Comment noted. Additional detail added to the EA. There is no regulatory agency but inspections will meet the requirements of our Certified Verification Agent (CVA).
23	Project Description	7 & 8	The proposal now includes "operation, maintenance, and eventual decommissioning" of the wind turbines. With respect to decommissioning, on p. 7 of the Description Document, it is stated that "all physical elements of the project would be removed and the site would be restored to its original condition". However, on p. 8, the Document states that "Each of the piling and the caisson would be cut 15 feet below the seabed and removed... The remaining piling structures (below 15 feet) would be left in place." Also, in the following paragraph, the Document states that, with reference to the cable, "Because full removal of all buried cable would cause disturbance to the established sea bed, power cables at each turbine location would be excavated to the 6-foot burial depth, cut and removed. All cabling at or below the 6-foot depth would be left in place undisturbed."	J. Uptegrove (NJGWS, NJDEP)	Comment noted. EA has been revised to clarify that “all physical elements of the project above the mudline would be removed and the seafloor at the site would be restored to its original condition.
24	Project Description		Comment: Leaving these materials buried in the offshore sediment is not the same as removing "all physical elements of the project", as the Document states. The seabed has already been disturbed by the emplacement of the cable originally. Those reviewing the Draft EA may want to evaluate this matter in more detail or make further inquiries of the developer regarding the Decommissioning Plan, or at least state the terms more accurately throughout the section.	J. Uptegrove (NJGWS, NJDEP)	Comment noted. See response to Comment #23.

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25	Project Description / Geological Resources / Marine Biological Resources	2-11	The Draft EA states: "The Post-Construction Work Plan and Post-Construction Monitoring Plan addresses the engineering, environmental, regulatory, and economic elements of the decommissioning task." (p. 2-11, Draft EA). I could not find that information in Appendix B. Decommissioning was addressed in the Draft EA with respect to the impacts on marine mammals, turtles, birds and bats, fisheries, and the benthos. As I understand it, Decommissioning is an added responsibility of the developer in the current proposal. As such, it would be helpful to have a more complete Decommissioning Plan included in one of the Appendices, including a discussion of the impacts to the marine sediment surface and sub-surface. This might include pre-Construction and post-Decommissioning high-resolution sub-bottom profiling of the areas in which the cable is trenched and/or removed.	J. Uptegrove (NJGWS, NJDEP)	Comment noted. Appendix B is a Post-Construction Monitoring Plan for birds bats and mammals. It does not discuss “the engineering, environmental, regulatory, and economic elements of the decommissioning task”. A comprehensive Decommissioning Plan is being drafted and will be added to Appendix B. It should be noted that Alpine conducted a pre-construction high-res sub-bottom profiling Geophysical Survey of the cable route.
26	Geotech / Geophysical	3-9	The Draft EA reports on additional geotechnical and geophysical data collected in 2010, 2011, and 2012, and specifically that borehole investigations were conducted to a depth of 150 feet below the sea floor at the site of each of the six turbines (p. 3-9, Draft EA). Can these data be included in an Appendix, or is there another vehicle for public access to these data?	J. Uptegrove (NJGWS, NJDEP)	Comment noted. Langan's geotechnical report (2010) and Alpine's Marine Geophysical Survey (2011) as well as the Post-Sandy study (2013) will be added to the Appendices.
27	Geology and Soils		The Draft EA reports: "The project area appears to be underlain by the unconsolidated Cape May Formation (upper Pleistocene-Holocene; 2 million years to 10,000 years ago)." Bedrock and Surficial maps of this area in the proximal onshore (vicinity of Atlantic City) indicate Miocene-age Kirkwood (Tkw) and Cohansey (Tch) Formations, overlain by Holocene- to Pleistocene-age salt marsh deposits (Qm), beach deposits (Qb0 and artificial fill (af) (Owens et al. 1998; Newell et al., 2000). The Cape may Formation is not found this far north. And the Cape May Formation is late Pleistocene in age, not as young as Holocene (10,000 to the present).	J. Uptegrove (NJGWS, NJDEP)	Comment noted. Miller et al. 1994, *Atlantic City Site Report* supports the analysis included in the EA.
28	GIS		Our agency, the NJGWS, NJDEP, routinely seeks out sources of marine subsurface data to expand our data archives and understanding of the New Jersey offshore. We would welcome access to any of the sub-bottom and other geophysical and geological data that the developer has acquired as part of this project.	J. Uptegrove (NJGWS, NJDEP)	Comment noted. See response to Comment #27.
29	Socioeconomics / Marine Biological Resources		The Marine Fisheries Administration does not foresee any obvious conflicts with the commercial fisheries resources off the immediate New Jersey coast or offshore waters.	K. Davis (NJDEP)	Comment noted.
30	Marine Biological Resources / Special Conditions		The typical timing restrictions for marine mammals, turtles and endangered species should be adhered to.	K. Davis (NJDEP)	Comment noted. Additional information has been added within the EA described the timing.

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31	Project Description (Permitting)	2-21	Permits and Authorizations issued, there is no mention of a NMFS Authorization under the ESA. What is the time frame for consultation and the issuance of a Biological Opinion?	K. Davis (NJDEP)	Comment noted. The NMFS issued a letter on 11 April 2012 in which they determined that with the inclusion of special conditions in an issued Department of the Army permit, the project is not likely to adversely affect listed threatened and endangered species in and around the project area.
32	Project Description / Special Conditions	2-23	Marine Mammals and Sea Turtles, Special Conditions under the USACE for protection of marine mammals and sea turtles, please define speeds.	K. Davis (NJDEP)	Comment noted. Speeds have been defined in Section 2.6.3.
33	Marine Biological Resources / Noise	3-44	Noise/exclusion zones, without reviewing a NMFS Biological Opinion, it is unclear how the agency will incorporate new acoustic guidelines for marine mammals (now in draft form) into their recommendations. Every effort should be made to ensure that noise guidelines and procedures used during the study are consistent with the most updated scientific information.	K. Davis (NJDEP)	Comment noted. Fishermen's will adhere to the exclusion zone condition listed in the USACE Department of the Army (DA) Permit (Condition #16) which states a 1,250-meter (4,100-foot) radius exclusion zone for listed marine mammals and sea turtles would be established around the jacketed foundation being installed in order to reduce the potential for serious injury or mortality of these species. If NMFS updates the conditions regarding noise/exclusion zones on the re-issued DA Permit based on new guidelines, then Fishermen's will adhere to them.
34	Project Description / Special Conditions	2-24	Special Condition 29 of NJDEP permit should also stipulate that any lighting that is required should be strobe rather than steady-state.	K. Davis (NJDEP)	Comment noted. This EA includes/references Special Condition 24 of the current NJDEP permit. Consequently, no changes to the EA have been made. If changes to the NJDEP permit are made, Fishermen's would comply with them.
35	Project Description	2-25	As far as ENSP is concerned, there are outstanding issues regarding the pre- and post-monitoring protocols that have been addressed or resolved.	K. Davis (NJDEP)	Comment noted. See responses to comments below for individual uses related to both re- and post-monitoring protocols.
36	Curtailment / Biological Resources	3-48	ENSP feels the use of a project specific area weather monitoring device an excellent idea to help inform curtailment needs. While the FACW has concerns that they would be unfairly asked to curtail when conditions did not warrant (but do on-shore), to what level is FAWC willing to commit to the feds/state that when the opposite is true (conditions on-shore not suggesting curtailment, but those detected by sensor do) there is a high level of trust that the operators will curtail occurring when needed when we are unable to see/monitor sensor data?	K. Davis (NJDEP)	FACW will curtail based on conditions in the project area, regardless of onshore conditions. We will have visibility monitoring systems at the northern and southern most turbines. The information provided by these sensors will inform us as to when actual site conditions merit curtailment.
37	Biological Resources	N/A	The interim pre-construction monitoring report addresses birds, marine mammals and sea turtles but does not indicate whether any bat surveys have been done. Please provide any up to date information.	K. Davis (NJDEP)	Comment noted. Section 3.4.1.2 discusses the pre-construction monitoring of bats. These reports have been added to the appendices.
38	Cultural Resources		At this time the HPO does not have enough information to properly evaluate the DOE determination that the proposed undertaking will have no adverse effect on historic properties.	J. West-Rosenthal (HPO)	Comment noted. The viewshed analysis report was revised and re-submitted in April 2015.

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39	Permitting		The applicant has requested all permit issuance by the end of May 2015. Currently, the applicant has not obtained all necessary approvals to construct the portion of the project in the ocean and will not be able to initiate that construction until the Department issues the waterfront development permit modification and any other required permits and approvals. However, as the applicant has not applied to modify the existing Coastal Area Facility Review Act (CAFRA) individual permit (IP) for the upland portion of the project, work can commence anytime in the upland area provided all CAFRA permit conditions are met and all required other permits and approvals are obtained.	A. Skowronek (DLUR)	Comment noted. Fishermen's will not begin construction on the in-water portion of the Project until the Waterfront Development Permit has been re-issued. It is understood that upland work can commence as long as all CAFRA permit conditions are met and all other upland permits and approvals are obtained. Language has been added to Section 2.5.4 to clarify.
40	Utilities / Permitting		A tidelands utility license shall be required for the proposed project. It is estimated that a price letter for the utility license may be issued within 30 days of the tidelands license file being deemed complete and the outstanding waterfront development permit modification approved.	A. Skowronek (DLUR)	Comment noted. Fishermen's received a Tidelands Utility License effective 4 May 2011 for a duration of 24 years. See Table 2-2.
41	Air Quality	3.2.2.1	In the attachment (10/10/11), Section 2.1 Construction Emissions, Table 1. Comparison of Construction Emissions to Conformity Applicability Levels, the total construction emissions (tons) for Nitrogen Oxides (NOx) are 61.3 tons, 1.75 tons fro Volatile Organic Compounds (VOCs), 26.7 tons for Carbon Monoxide 1.9 tons for Particulate Matter (PM10), 1.9 tons for Fine Particulate Matter (PM2.5) and 6.1 tons for Sulfur Dioxide (SO2). In comparison, in the Draft EA, Section 3.2.2.1 Air Quality - Construction Phase, Table 3-2 Comparison of Construction Emissions to Conformity Applicability Levels, the total construction emissions (tons per year (tpy)) for NOx is 24.1 tpy, 2.5 tpy for VOCs, 33.1 tpy for CO, 2.7 tpy for PM10, 2.7 tpy for PM2.5 and 11.7 for SO2.	A. Skowronek (DLUR)	Comment noted. Refer to response to Comment #6.
42	Air Quality	3.2.2.1	In the attachment (10/10/11), in Section 2.1 Construction Emissions, the marine vessel emissions from travel along marine routes are enumerated for the jacket foundation, turbine installation and cable installation. The attachment states that a .68 load factor was used for the jacket foundation transit and for the ocean portion of the transit for the turbine and cable installation. A .31 load factor was used for transit on the Delaware River. in comparison, Section 3.2.2.1 Air Quality-Construction Phase, in the Draft EA does not enumerate the marine vessel emissions from travel along marine routes for the jacket foundations, turbine or the cable installation. The Draft EA does not indicate that the .68 load factor was used for the jack foundation transit and for the ocean portion transit for the turbine and cable installation.	A. Skowronek (DLUR)	Comment noted. Refer to response to Comment #6.
43	Air Quality	3.2.2.1	In the attachment (10/10/11), Section 2.1 Construction Emissions, the reason provided for a decrease in emissions was due to three factors. One factor was due to a commitment to use a Tier 2 tug for the 4,000 horsepower (hp) construction tug. A similar commitment does not appear to be included in the Draft EA. This Department commends the Fishermen's Energy project team for its commitment to use a Tier 2 4,000 hp construction tug for this project.	A. Skowronek (DLUR)	Comment noted. Refer to response to Comment #7.

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44	Air Quality	3.2.2.1	Please explain the inconsistencies in the information provided in the Draft EA compared to the information provided in the attachment (10/10/11) concerning the emission estimates, load factors and commitment to use a Tier 2 construction tug. Please clarify which emission estimates are accurate for this project.	A. Skowronek (DLUR)	Comment noted. Refer to response to Comment #7.
45	Air Quality	3.2.2.1	Please explain how the 2/19/15 cover letter from the DOE to the USEPA, can indicate there are no changes to the emission estimates considering that the application for a permit modification (date 2/26/15) indicates an increase in the amount and size of piles to be drive. An increase in construction emissions. Please explain how the emissions that would result from an increase in the size and amount of pile driving can be included in the emissions estimates in the attachment, when the attachment is dated 10/10/11 and the application for a permit modification is dated 2/26/15.	A. Skowronek (DLUR)	Refer to response to Comments #6 and #7. The overall construction time and effort is similar between the original proposal and the revised proposal. These changes have been incorporated into the new analysis. See Appendix G.
46	Air Quality	2.2.4	In the attachment (10/10/11), there is only one jacket tug listed in Table 8. Marine Travel Emissions. Please clarify if a second tug is required to transport the jacket foundations to the project site. Please clarify if the emissions for two tugs have been included in the emission estimates in Table 8. Marine Travel Emissions in the attachment (10/10/11) and in Table 3-2 Comparison of Construction Emissions to Conformity Applicability Levels in the Draft EA.	A. Skowronek (DLUR)	Refer to response to Comments #6 and #7. The conformity analysis included an evaluation of multiple tugs and their potential contribution to the atmospheric emissions. However, it was assumed that the largest tug possible would be used for the work. See Appendix G.
47	Air Quality / Transportation	2.2.4	Please clarify if the emissions from the transportation of the turbines to the Beckett Street Marine Terminal have been included in Table 1. Comparison of Construction Emissions to Conformity Applicability Levels in the attachment (10/10/11) and in Table 3-2 Comparison of Construction Emissions to Conformity Applicability Levels in the Draft EA.	A. Skowronek (DLUR)	Yes these were included. Refer to response to Comments #6 and #7. See Appendix G.
48	Air Quality / Transportation	2.2.4	Please clarify if the emissions from the transportation of the foundations to the staging area at Beckett Street Marine Terminal have been included in Table 1. Comparison of Construction Emissions to Conformity Applicability Levels in the attachment (10/10/11) and in Table 3-2 Comparison of Construction Emissions to Conformity Applicability Levels in the Draft EA.	A. Skowronek (DLUR)	Yes these were included. Refer to response to Comments #6 and #7. See Appendix G.
49	Air Quality		Diesel exhaust contributes the highest cancer risk of all air toxics in New Jersey and is a major source of NOx within the state. Therefore, NJ DEP recommends that construction projects involving non-road diesel construction equipment operating in a small geographic area over an extended period of time implement the following measure to minimize the impact of diesel exhaust:	J. Canotr (NJDEP)	Comment noted. See responses below.
50	Special Procedures		1. All on-road vehicles and non-road construction equipment operating at, or visiting, the construction site shall comply with the three minute idling limit, pursuant to N.J.A.C. 7:27-14 and J.J.A.C. 7:27-15. Consider purchasing "No Idling" signs to post at the site to remind contractors to comply with the idling limits. Signs are available for purchase from the Bureau of Mobile Sources.	J. Canotr (NJDEP)	Comment noted. Fishermen’s construction contractors will abide by N.J.A.C. 7:27-14 and N.J.A.C. 7:27-15 as well as all other local, State and Federal ordinances regarding construction equipment. Refer to Section 2.6.7.

Comment Number	Section Number	Original Page Number	Comment	Commenter	Response
51	Special Procedures		2. All non-road diesel construction equipment greater than 100 horsepower used on the project for more than ten days should have engines that meet the USEPA Tier 4 non-road emission standards, or the best available emission control technology that is technologically feasible for that application and is verified by the USEPA or the CARB as a diesel emission control strategy for reducing particulate matter and/or NOx emissions.	J. Canotr (NJDEP)	Comment noted. Fishermen's construction contractors will abide by USEPA Tier 4 non-road emission standards or the best available emission control technology that is technologically feasible, as well as all other local, State and Federal ordinances regarding construction equipment. Refer to 2.6.7.
52	Special Procedures		3. All on-road diesel vehicles used to haul materials or traveling to and from the construction site should use designated truck routes that are designed to minimize impacts on residential areas and sensitive receptors such as hospitals, schools, daycare facilities, senior citizen housing, and convalescent facilities.	J. Canotr (NJDEP)	Comment noted. Fishermen's construction contractors will use designated truck routes that are designed to minimize impacts on residential areas and sensitive receptors such as hospitals, schools, daycare facilities, senior citizen housing, and convalescent facilities to the extent possible. refer to Section 2.6.9.
53	Appendix B, 4.2		Acoustical survey plan includes one detector attached to a meteorological buoy at the proposed site of one turbine, to record continuously at night during the fall and spring migration windows (Aug 15-Oct 15 and April 1-May 15). This is a good start; ideally there would be more unit set to record activity within the proposed rotor-swept areas of each turbine, or at least at a few additional locations along the proposed 6-turbine corridor. NJDEP's protocol document recommends 3 detectors per turbine - 2 for the horizontal plane and 1 for the vertical - with microphones facing the direction of oncoming migrants (i.e., facing north in fall and south in spring) (p. 9). Stationary acoustic surveys at the site of each turbine will be especially important in the post-construction phase. NJDEP protocol also requires reference sites as part of a BACI study design.	K. Davis (NJDEP)	This has not been requested during permit modification approval with NJDEP. To maintain consistency with the pre-construction monitoring, our current plan for post-construction monitoring matches that work. If NJDEP would like to discuss removing the boat-drawn survey with additional static detectors, Fishermen's is open to that discussion, as long as the same methodology can be used for both bats and birds.
54	Appendix B, 4.2		Acoustical surveys are also planned to occur once weekly along a 20-mile transect via a boat-drawn dirigible (blimp) during the migration windows. Since acoustic transects have already been run and used to model bat activity within the off-shore region (DEP Office of Science, Ocean/Wind Power Ecological Baseline Studies, 2010) and the proposed turbine locations have been chosen, I again think it would be more meaningful to do stationary/continuous monitoring at the turbine locations to gage bat activity at the action locations impacted. Especially during post-construction surveillance, when bats could be drawn to the turbines out of curiosity or for food, rest, shelter, or mates (Cryan et al. 2014).	K. Davis (NJDEP)	See response to comment above.
55	Appendix B, 4.3		ENSP is glad to see that infrared video and high resolution camera surveillance are planned n the post-construction phase, as a way to visually monitor bat activity and interaction with the turbines. This will be the main way that fatalities are documented, since carcass searches are impracticable over open water.	K. Davis (NJDEP)	Comment noted. No revisions required to the EA.

Comment Number	Section Number	Original Page Number	Comment	Commenter	Response
56	Appendix B, 4.3		Ultimately, bats are difficult and intensive to monitor, and they have been found to pass through this off-shore area during migration. Operational adjustments/curtailments should be built into the management of this wind farm to keep bat and bird fatalities to a minimum. Special Condition 31 of the USACE Individual Permit and Special Condition 25 of the NJDEP Permit require curtailment or shut-down of all turbines during certain conditions in the fall and spring migration windows (Aug 1-Oct 31 and March 15-June 15), not to exceed 360 hours per year per turbine. For bats, the horus between sunset and sunrise during migration when termpatures are >50F and wind speeds are <6 m/sec are the most acitive and sensitive and should be safeguarded.	K. Davis (NJDEP)	Comment noted. No revisions required to the EA.

Esther V. Steele
129 S. Ridgeway Ave. ~ Atlantic City, New Jersey 08401

March 5,2015

U.S. DOE
Golden Field Office
NEPA Division
15013 Denver West Parkway
Golden, Colorado 80401

Re: Fishermen's Atlantic City Windfarm LLC (FACW)
Atlantic City, New Jersey

To Whom It May Concern,

The BPU has twice rejected the application to create a field of wind turbines off the shore of Atlantic City. They have expressed their concern that it would cause a large increase in cost to the consumer for their energy. The Federal Government would support this project by loans and subsidies. How long would this support last? As with any government project this type of subsidy is subject to change at any time.

We have high cost for electricity in Atlantic City and through out the state. I really do not want to have to pay more for the energy that we receive. As a senior citizen the cost of living in New Jersey has greatly increased in the time that we have been living here. The Federal Government tells us that the great recession is no more and that the nation is growing and jobs are plentiful. Where? Not here in New Jersey and not in Atlantic City where many people are still out of work and taxes have been raised 52% in the past 2 years.

The emphasis should be to help lower the cost of living in this area and create a standard of living for the many people that are still struggling to maintain a decent way of life.

Sincerely,
Esther V Steele
Carl Steele

Esther V. Steele
Carl Steele

From: Gray, Lori
To: Gray, Lori
Subject: FW: Fisherman"s Atlantic City Windfarm
Date: Monday, March 16, 2015 2:27:25 PM

-----Original Message-----
From: Robert Fleisher [mailto:drmf19006@yahoo.com]
Sent: Thursday, March 05, 2015 12:32 PM
To: GO NEPA
Subject: Fisherman's Atlantic City Windfarm

I write in protest of the proposed development of an offshore wind renewable energy facility along the coast of Atlantic City.
Each morning I look out at the magnificence of the ocean. I behold the beauty and the vast nature of the never ending tidal forces. The last thing I want to see is a farm of windmills souring the horizon.
I'm sure environmentalists are all for renewable energy, but I also thought they want to preserve the wilds, the forest, the natural beauty of world around us. To that end, there couldn't be a more disruptive blot on our wonder of the world we call the ocean.
Please do not fund this project.

Robert Fleisher D.M.D.

From: Gray, Lori
To: Gray, Lori
Subject: FW: Fishermen’s Atlantic City Windfarm, LLC Offshore Wind Demonstration Project, offshore Atlantic City, New Jersey
Date: Monday, April 06, 2015 1:36:04 PM

From: Thomas Fritz [mailto:tlfflt1983@gmail.com]
Sent: Thursday, April 02, 2015 10:14 PM
To: GO NEPA
Subject: Fishermen’s Atlantic City Windfarm, LLC Offshore Wind Demonstration Project, offshore Atlantic City, New Jersey

THIS NOTE CONCERNS: EA-1970: NOTICE OF AVAILABILITY OF DRAFT ENVIRONMENTAL ASSESSEMENT. FISHERMEN’S ATLANTIC CITY WINDFARM, LLC OFFSHORE WIND DEMONSTRATION PROJECT, OFFSHORE ATLANTIC CITY, NEW JERSEY

I CAN SEE NO COMPELLING NEED FOR A PROJECT THAT DOES NOT PRODUCE AFFORDABLE ENERGY. YOU HAVE MADE NO AFFORDABILITY ANALYSIS. YOU SHOULD NOT HAVE WASTED THE TIME ON THE ENVIRONMENTAL ASSESSMENT. THIS PROJECT IS UN-BUILDABLE. TALK ABOUT THROWING MONEY INTO A HOLE IN THE WATER. THIS GROUP CLAIMS TO MAKE MORE MONEY ON TOURISM THAN ON PRODUCTION OF ENERGY.

TOM FRITZ

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 2
290 BROADWAY
NEW YORK, NY 10007-1866

APR 0 1 2015

DOE Golden Field Office
c/o NEPA Division
15013 Denver West Parkway
Golden, CO 80401

RE: DOE/EA-1970

Dear Sir or Madam:

The U.S. Environmental Protection Agency (EPA) has reviewed the Department of Energy's (DOE) environmental assessment (EA) for the Fishermen's Atlantic City Windfarm (FACW), to be located approximately 2.8 miles offshore Atlantic City, New Jersey. The proposed project would consist of up to six wind turbine generators that would generate up to approximately 25 Megawatts of electricity and the necessary electrical transmission facilities (i.e., undersea and underground cable) to connect the wind farm to an existing electrical substation, located in Atlantic City, for the interconnection to the regional power grid.

DOE is providing support for FAWC as one of the regionally-diverse Advance Technology Demonstration Projects through collaborative partnerships to support DOE's and the Department of the Interior's National Offshore Wind Strategy. The United States Army Corps of Engineers (USACE) is a cooperating agency in the development of this EA, due to the applicant's need to modify an existing Department of the Army permit for this project. The project has been modified since issuance of the Department of the Army permit; the DOE is reviewing the entire scope of the modified project, and the USACE is only reviewing those portions of the original project that have been modified.

Based on our review of the draft EA, we do not anticipate that the proposed FACW would result in significant adverse environmental impacts. However, EPA does have some technical comments on the General Conformity Applicability Analysis.

- For nitrogen oxides (NOx), the emissions shown in the general conformity section of the EA (starting on page 3-16) are less than half of the values in the general conformity report in the Appendix (page 177) with no explanation for the difference. The assumptions seem to be the same between the two sections. Please update the appendix and/or provide new data to justify the differences.

- The assumption to use Tier 3 nonroad engines to represent a blend of Tier 2 and Tier 4 engines is not valid. The Tier 3 and Tier 4 NOx standards are identical, while the Tier 3 and Tier 4 particulate matter (PM) standards are not. However, going from Tier 2 to Tier 3 lowers the NOx standard with PM remaining the same. Therefore, using Tier 3 to represent a combination of Tiers 2 and 4 will lead to an underestimation of NOx and overestimation of PM. EPA estimates that the additional extra tons of NOx are not going to cause the project to exceed de minimis, but this assumption should still be addressed by the DOE.

- The on-road portion of the analysis is based on Mobile6.2. Please note that EPA's MOVES is the currently-approved on-road mobile source emissions model for conformity purposes.

In addition, on December 18, 2014, CEQ released revised draft guidance for public comment that describes how Federal departments and agencies should consider the effects of greenhouse gas (GHG) emissions and climate change in their NEPA reviews. The revised draft guidance supersedes the draft greenhouse gas and climate change guidance released by CEQ in February 2010. The 2014 Guidance states that Agencies should consider the following when addressing climate change: (1) the potential effects of a proposed action on climate change as indicated by its GHG emissions; and (2) the implications of climate change for the environmental effects of a proposed action.

Thank you for the opportunity to comment on this EA. If you have any questions, please call Lingard Knutson of my staff at (212) 637-3747.

Sincerely,

Grace Musumeci

Grace Musumeci, Chief
Environmental Review Section

cc: Lawrence Slavitter, USACOE Philadelphia District

State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION
OFFICE OF PERMIT COORDINATION AND ENVIRONMENTAL REVIEW
P.O. Box 420 Mail Code 401-07J Trenton, New Jersey 08625-0420
Telephone Number (609) 292-3600
FAX NUMBER (609) 633-2102

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

April 02, 2015

Ms. Lori A. Gray, NEPA Division Director
United States Department of Energy
Golden Field Office, c/o NEPA Division
115013 Denver West Parkway
Golden, Colorado 80401

RE: Fisherman's Atlantic City Windfarm
Offshore of Atlantic City, Atlantic County
Docket # EA-1970
Comments on Draft Environmental Assessment
USDOE – Office of Energy Efficiency and Renewable Energy

Dear Ms. Gray:

The New Jersey Department of Environmental Protection's (Department) Office of Permit Coordination and Environmental Review (PCER) distributed, for review and comment, the Draft Environmental Assessment prepared by the US Department of Energy (DOE) for a proposed 25MW offshore wind renewable energy facility. This facility consists of up to six (6) turbines located 2.8 miles off of Atlantic City, Atlantic County, a submarine alternating current cable connecting the turbines, and a submarine transmission cable and an underground cable that would connect the offshore turbine facility with the existing onshore Huron power substation in Atlantic City. Horizontal directional drilling (HDD) will be utilized to construct the onshore cable. We offer the following comments for your consideration.

NJ Geological and Water Survey

Comments on Draft EA, Fishermen's Atlantic City Windfarm (FACW)

This review focused on the Description Document of the Proposed Project (02/09/2015, DOE) which summarizes those parts of the Draft EA that are different from an earlier proposal of this project. The material presented in the Description Document and the Diagrams and Figures in Appendix A (of the Draft EA) were reviewed with relevant sections of the Draft EA (DOE/EA-1970, 02/2015).

Comments on the Description Document

1. Regarding the location of the wind turbines on identified sand shoals: this matter was addressed in the previous proposal. The current proposal maintains the 250-foot buffer around the proposed cable route in the borrow areas.

2. Regarding the construction of the turbine foundations:

    a. The Description Document states: "Engineering analyses have determined that the base of each foundation will no longer require a scour protection mat or rock scour protection around each foundation pile." If it is not included, that would be a significant decrease in disturbance of the seafloor, as long as the foundation piles did not create a current environment that would promote sediment scouring. Please discuss in more detail.

    b. Regarding the foundation of turbines: requires that four 84-inch-diameter piles are driven approximately 150 feet below the mudline (water bottom). Previous design required eighteen 48-inch-diameter piles driven into openings on the three ends of the foundation structure. I believe the former design did not drive the piles as deep. Will driving deeper require a stronger motor or pile-driving tool? Can the developer include a discussion of how the piles will be anchored in the sediment, and whether this style of foundation needs a certain sediment type or texture for stability? Have engineering properties been tested on sediments from the borings? Is there past experience with this foundation design from other projects that can be cited as evidence or as a construction model, to help with evaluating the proposal?

    c. Are there geotechnical surveys that were conducted by the developer to determine what materials they would be drilling in the excavation/installation of the cable and the pile driving of the foundations of the turbines? Can that information or a link to that study be footnoted in the Description Document or a Summary Document? This is of some concern due to what I think must be the deeper driving of the three piles into the subsurface in the IBGS foundation design compared to the shallower pile driving for the original monopole foundation proposal. Can the developer address that change in the Description Document?

3. Regarding Cable Route and Installation:
    a. I believe that the HDD method of excavating and installing cable is new to this proposal. This section of the Description Document appears to have some conflicting statements. Specifically, the penultimate sentence of the top paragraph on p. 6 appears to conflict with the depth description for the rest of the onshore cable running to the Huron sub-station. The result is that it is not clear if the depth is 20 feet or 25 feet. Perhaps this part of the plan could be explained in more detail in the Description Document, as it is a change from the previous plan, as I understand it.

b. Re: the cables, there is a footnote cited in that part of the document that states that the Horizontal Directional Drilling (HDD) method will be used to install excavate and install the onshore section of the cable, and extend as far offshore as 1800 feet (water depth of about 12 feet), where it will be converted from a PVC tube-protected cable to a cable that rests in a trench that has been jet-plowed and buried to a "target" depth of 6 feet below the seafloor. However, there is no footnote corresponding to the citation in the text with a superscript, [16.] The note is in the Draft EA, p. 2-10, footnote 2). That information is needed (perhaps with a reference to where in the proposal the HDD method is explained in more detail). It would be helpful to have this revised method described in greater detail in an Appendix or other associated document.

c. On the outboard end, the buried cable depth is changed from 9 feet to 6 feet. This change in the depth of the cable is beyond the expertise of The New Jersey Geological and Water Survey (NJGWS); however, if it is buried 3 feet closer to the seafloor, then there may be increased risk of excavation by marine currents which are active in the nearshore. There may be someone who oversees the transatlantic cables originating in New Jersey who can provide expert review of this design and changed burial depth.

d. Similarly, the cable diameter has decreased from 8 inches to 5 inches. As I understand it, this change will not result in increased disturbance to the subsurface.

e. Is there a section in the Draft EA or more that could be included in the Description Document, or an additional figure included that depicts the connection point of the turbine cables with the main export cable? This is challenging to visualize, and leaves some doubt about the safety and durability of the interconnection and its protection against excavation by marine currents.

f. The burial depth of the onshore-to-1800-feet-offshore, PVC-protected cable is shown at a maximum of 27 feet below mean high water at station 14 to 15 on Drawing C-2. Is there a reason why the cable dips so low and then has to shallow to the depth of 6 feet below sea floor of the jet-plow/burial section of the cable? Is there a reason why the depth is not more uniform?

g. Related question: What is considered a "safe" and/or non-intrusive standard burial depth of subsurface marine cables? It would be better if the document could state or refer the reviewer to parts of the EA in which the existing technology or guidelines are cited, such that one can evaluate what previous experience has been, and what the current expertise is. Maybe this was addressed in the original proposal.

h. Also because of the introduction of the HDD technology to this project, additional description/explanation of the interconnection between the PVC-encased cable and the non-encased section would be helpful.

4. Regarding the Operations and Maintenance Plan, inspections of the underwater structures and seabed will be performed by "personnel qualified by the manufacturer", at a minimum of once per year. Is there a regulatory body that will oversee or review these inspections? To whom will the results be reported? Is there an oversight mechanism in place, perhaps from already existing onshore wind turbine regulation?

5. The proposal now includes "operation, maintenance, and eventual decommissioning" of the wind turbines. With respect to <u>decommissioning</u>, on p. 7 of the Description Document, it is stated that "all physical elements of the project would be removed and the site would be restored to its original condition". However, on p. 8, the Document states that "Each of the pilings and the caisson would be cut 15 feet below the seabed and removed… The remaining piling structures (below 15 feet) would be left in place." Also, in the following paragraph, the Document states that, with reference to the cable, "Because full removal of all buried cable would cause disturbance to the established sea bed, power cables at each turbine location would be excavated to the 6-foot burial depth, cut and removed. All cabling at or below the 6-foot depth would be left in place undisturbed."

Comment: Leaving these materials buried in the offshore sediments is not the same as removing "all physical elements of the project", as the Document states. The seabed has already been disturbed by the emplacement of the cable originally. Those reviewing the Draft EA may want to evaluate this matter in more detail, or make further inquiries of the developer regarding the Decommissioning Plan, or at least state the terms more accurately throughout the section.

<u>Comments on the Draft EA</u>

1. The Draft EA states: "The Post-Construction Work Plan and Post-Construction Monitoring Plan addresses the engineering, environmental, regulatory, and economic elements of the decommissioning task." (p. 2-11, Draft EA). I could not find that information in Appendix B. Decommissioning was addressed in the Draft EA with respect to the impacts on marine mammals, turtles, birds and bats, fisheries, and the benthos. As I understand it, Decommissioning is an added responsibility of the developer in the current proposal. As such, it would be helpful to have a more complete Decommissioning Plan included in one of the Appendices, including a discussion of the impacts to the marine sediment surface and sub-surface. This might include pre-Construction and post-Decommissioning high-resolution sub-bottom profiling of the areas in which the cable is trenched and/or removed.

2. The Draft EA reports on additional geotechnical and geophysical data collected in 2010, 2011, and 2012, and specifically that borehole investigations were conducted to a depth of 150 feet below the sea floor at the site of each of the six turbines (p. 3-9, Draft EA). Can these data be included in an Appendix, or is there another vehicle for public access to these data?

3. The Draft EA reports: "The project area appears to be underlain by the unconsolidated Cape May Formation (upper Pleistocene-Holocene; 2 million years to 10,000 years

ago)." Bedrock and Surficial maps of this area in the proximal onshore (vicinity of Atlantic City) indicate Miocene-age Kirkwood (Tkw) and Cohansey (Tch) Formations, overlain by Holocene- to Pleistocene-age salt marsh deposits (Qm), beach deposits (Qb) and artificial fill (af) (Owens et al., 1998; Newell et al., 2000). The Cape May Formation is not found this far north. And the Cape May Formation is late Pleistocene in age, not as young as Holocene (10,000 to the present).

Access to developer's sub-bottom geophysical and geologic data

Our agency, the NJGWS, NJDEP, routinely seeks out sources of marine subsurface data to expand our data archives and understanding of the New Jersey offshore. We would welcome access to any of the sub-bottom and other geophysical and geological data that the developer has acquired as part of this project.

References Cited:

Newell, W.L, Powars, D.S., Owens, J.P., Stanford, S.D., Stone, B.D., 2000, Surficial geologic map of central and southern New Jersey: U.S. Geological Survey Miscellaneous Investigations Series Map I-2540-D, scale 1:100,000, 3 sheets and text pamphlet.

Owens, J.P., Sugarman, P.J., Sohl, N.F., Parker, R.A., Houghton, H.F., Volkert, R.A., Drake, A.A., Jr., Orndorff, R.C., 1998, Bedrock geologic map of central and southern New Jersey: U.S. Geological Survey, Miscellaneous Investigations Series Map I-2540-B, scale 1:100,000, 4 sheets.

If you have any additional questions, please contact Jane Uptegrove at (609) 292-2576 or (Jane.Uptegrove@dep.nj.gov).

Natural and Historic Resources

The Department's Division of Fish and Wildlife (DFW) has reviewed the Draft EA and project modifications and has the following comments.

Bureau of Marine Fisheries:

The Marine Fisheries Administration does not foresee any obvious conflicts with the commercial fisheries resources off the immediate New Jersey coast or offshore waters. The typical timing restrictions for marine mammals, turtles and endangered species should be adhered to. Although marine construction of this scale and the associated activities that will be conducted are known to disturb the activities and migration of many species of fish, the Marine Fisheries Administration feels the activities as described will be isolated when performed and will not adversely affect either the industry involved with commercial fisheries off New Jersey or the species harvested.

Endangered & Non-game Species Program:

- **Pg. 2-21**, Permits and Authorizations issued, there is no mention of a NMFS Authorization under the ESA. What is the time frame for consultation and the issuance of a Biological Opinion?

- **Pg. 2-23**, Marine Mammals and Sea Turtles, Special Conditions under the USACE for protection of marine mammals and sea turtles, please define slow speeds.

- **Pg. 3-44**, noise/exclusion zones, without reviewing a NMFS Biological Opinion, it is unclear how the agency will incorporate new acoustic guidelines for marine mammals (now in draft form) into their recommendations. Every effort should be made to ensure that noise guidelines and procedures used during the study are consistent with the most updated scientific information.

- **Pg. 2-24** Special Condition 29 of NJDEP permit should also stipulate that any lighting that is required should be strobe rather than steady-state.

- **Pg. 2-25** As far as ENSP is concerned, there are outstanding issues regarding the pre- and post-monitoring protocols that have not been addressed or resolved.

- **Pg. 3-48** ENSP feels the use of a project specific area weather monitoring device an excellent idea to help inform curtailment needs. While the FACW has concerns that they would be unfairly asked to curtail when conditions did not warrant (but do on-shore), to what level is FAWC willing to commit to the feds/state that when the opposite is true (conditions on-shore not suggesting curtailment, but those detected by sensor do) there is a high level of trust that the operators will curtail operations? How can the regulatory agencies be certain that curtailment is occurring when needed when we are unable to see/monitor sensor data?
- The interim pre-construction monitoring report addresses birds, marine mammals and sea turtles but does not indicate whether any bat surveys have been done. Please provide any up to date information.

Comments on GMI's Technical Work Plan for Post-Construction Avian, Bat, and Marine Mammal Studies (Re: bats):

Section 4.2 Acoustical survey plan includes one detector attached to a meteorological buoy at the proposed site of one turbine, to record continuously at night during the fall and spring migration windows (Aug 15-Oct 15 and April 1-May 15). This is a good start; ideally there would be more units set to record activity within the proposed rotor-swept areas of each turbine, or at least at a few additional locations along the proposed 6-turbine corridor. NJDEP's protocol document recommends 3 detectors per turbine - 2 for the horizontal plane and 1 for the vertical - with microphones facing the direction of oncoming migrants (i.e. facing north in fall and south in spring) (p. 9). Stationary acoustic surveys at the site of each turbine will be especially important in the post-construction phase. NJDEP protocol also requires reference sites as part of a BACI study design.

Acoustical surveys are also planned to occur once weekly along a 20-mile transect via a boat-drawn dirigible (blimp) during the migration windows. Since acoustic transects have already been run and used to model bat activity within this off-shore region (DEP

Office of Science, Ocean/Wind Power Ecological Baseline Studies, 2010) and the proposed turbine locations have been chosen, I again think it would be more meaningful to do stationary/continuous monitoring at the turbine locations to gage bat activity at the actual locations impacted. Especially during post-construction surveillance, when bats could be drawn to the turbines out of curiosity or for food, rest, shelter, or mates (Cryan et al., 2014).

Section 4.3 ENSP is glad to see that infrared video and high resolution camera surveillance are planned in the post-construction phase, as a way to visually monitor bat activity and interaction with the turbines. This will be the main way that that fatalities are documented, since carcass searches are impracticable over open water.

Ultimately, bats are difficult and intensive to monitor, and they have been found to pass through this off-shore area during migration. Operational adjustments/curtailments should be built into the management of this wind farm to keep bat and bird fatalities to a minimum. Special Condition 31 of the USACE Individual Permit and Special Condition 25 of the NJDEP Permit require curtailment or shut-down of all turbines during certain conditions in the fall and spring migration windows (Aug 1-Oct 31 and March 15-June 15), not to exceed 360 hours per year per turbine. For bats, the hours between sunset and sunrise during migration when temperatures are >50F and wind speeds are <6 m/sec are the most active and sensitive and should be safeguarded.

If you have any additional questions, please contact Kelly Davis at (908) 236-2118.

Cultural and Historic Resources

The Department of Energy (DOE) recently provided the Historic Preservation Office (HPO) the opportunity to review and comment on the potential for the above-referenced undertaking to affect historic properties, pursuant to their obligations under Section 106 of the National Historic Preservation Act of 1966, as amended, and it's implementing regulations, 36 CFR §800. At this time the HPO does not have enough information to properly evaluate the DOE determination that the proposed undertaking will have no adverse effect on historic properties. Additional information was requested as per the enclosed correspondence.

If additional consultation with the HPO is needed for this undertaking, please reference the HPO project number 10-1023 in any future calls, emails, submissions or written correspondence to help expedite your review and response. If you have any questions, contact Jesse West-Rosenthal at (609) 984-6019.

Land Use Regulation Program

The Division of Land Use Regulation (DLUR) offers the following comments in response to the Draft EA:

Coastal Regulation

Fishermen's Energy has applied to modify the previously issued Waterfront Development Permit (LUR File #0102-09-0024.2, WFD140001). The purpose of the modification is to change the turbine foundations from a monopole to a jacketed foundation, remove the previously authorized scour protection from the base of the foundations, change the transition point for HDD to jet-plow from 2,200 feet outshore to 1,800 feet outshore (will transition to jet-plow closer to shore), change the cable route from the turbine field at turbine #3 to Tennessee Ave. (previous was at turbine #6), reduce the offshore cable burial depth to 6 feet from 9 feet, and modify the cable size to a diameter of 8 inches or less.

The applicant has requested all permit issuance by the end of May 2015. Currently, the applicant has not obtained all necessary approvals to construct the portion of the project in the ocean and will not be able to initiate that construction until the Department issues the waterfront development permit modification and any other required permits and approvals,. However, as the applicant has not applied to modify the existing Coastal Area Facility Review Act (CAFRA) individual permit (IP) for the upland portion of the project, work can commence anytime in the upland area provided all CAFRA permit conditions are met and all required other permits and approvals are obtained.

If you have any additional questions, please contact Janet Stewart in the Land Use Regulation Program at (609) 777-3819.

Tidelands

A tidelands utility license shall be required for the proposed project. It is estimated that a price letter for the utility license may be issued within 30 days of the tidelands license file being deemed complete and the outstanding waterfront development permit modification approved. For confirmation and information regarding obtaining the tidelands license, please contact Richard Castagna in the Tidelands program at (609) 633-7956.

Air Quality - Planning

The Bureau of Air Quality Planning (BAQP) has reviewed the Draft Environmental Assessment (EA) for the Fishermen's Atlantic City Windfarm (February 2015) and has the following comments relating to the United States Environmental Protection Agency's (USEPA's) Federal General Conformity regulation (40 CFR Part 93):

1. Section 3.2.2.1 Air Quality/Appendix C: Complete Agency Correspondence and Enclosures

There appears to be inconsistencies in information provided in Section 3.2.2.1 Air Quality – General Conformity in the Draft EA compared to information provided in Appendix C: Complete Agency Correspondence and Enclosures. Appendix C includes a cover letter from the Department of Energy (DOE) to the United States Environmental Protection Agency (USEPA) (dated 2/9/15), with an attachment (dated 10/10/11) entitled Revision 2: General Conformity Applicability Determination for a 25 MW Wind Farm Offshore Atlantic City, NJ based on EPA/NJDEP Comments. The 2/9/15 cover letter indicates that a permit modification was submitted to the United States Army Corps of Engineers (USACE) and that a review of the proposed project changes will not impact the analysis, since there will be no new types of vessels used, and no increase in vessel size or in the number of vessels used in association with the change in foundation type. The inconsistencies are as follows:

a) In the attachment (10/10/11), Section 2.1 Construction Emissions, Table 1. Comparison of Construction Emissions to Conformity Applicability Levels, the total construction emissions (tons) for Nitrogen Oxides (NOx) are 61.3 tons, 1.75 tons for Volatile Organic Compounds (VOCs), 26.7 tons for Carbon Monoxide, 1.9 tons for Particulate Matter (PM10), 1.9 tons for Fine Particulate Matter (PM2.5) and 6.1 tons for Sulfur Dioxide (SO2). In comparison, in the Draft EA, Section 3.2.2.1 Air Quality - Construction Phase, Table 3-2 Comparison of Construction Emissions to Conformity Applicability Levels, the total construction emissions (tons per year (tpy)) for NOx is 24.1 tpy , 2.5 tpy for VOCs, 33.1 tpy for CO, 2.7 tpy for PM10, 2.7 tpy for PM2.5 and 11.7 for SO2.

b) In the attachment (10/10/11), in Section 2.1 Construction Emissions, the marine vessel emissions from travel along marine routes are enumerated for the jacket foundation, turbine installation and cable installation. The attachment states that a .68 load factor was used for the jacket foundation transit and for the ocean portion of the transit for the turbine and cable installation. A .31 load factor was used for transit on the Delaware River. In comparison, Section 3.2.2.1 Air Quality-Construction Phase, in the Draft EA does not enumerate the marine vessel emissions from travel along marine routes for the jacket foundations, turbine or the cable installation. The Draft EA does not indicate that the .68 load factor was used for the jacket foundation transit and for the ocean portion transit for the turbine and cable installation.

c) In the attachment (10/10/11), Section 2.1 Construction Emissions, the reason provided for a decrease in emissions was due to three factors. One factor was due to a commitment to use a Tier 2 tug for the 4,000 horsepower (hp) construction tug. A similar commitment does not appear to be included in the Draft EA. The Department commends the Fishermen's Energy project team for its commitment to use a Tier 2 4,000 hp construction tug for this project.

Comment #1 (Applies to 1(a), 1(b) and 1(c).
Please explain the inconsistencies in the information provided in the Draft EA compared to the information provided in the attachment (10/10/11) concerning the emission estimates, load factors and commitment to use a Tier 2 construction tug. Please clarify which emission estimates are accurate for this project.

2. The 2/9/15 cover letter, with the attachment (10/10/11), indicates that a permit modification was submitted to the USACE and that a review of the proposed project changes will not impact the analysis, since there will be no new types of vessels used, and no increase in vessel size or in the number of vessels used in association with the change in foundation type. However, a review of the application for a permit modification (dated 2/26/15) submitted by Fishermen's Energy to the USACE, indicates an increase in the amount and size of the piles to be driven. The application for a permit modification indicates the currently permitted amount of pile driving is for eighteen (18) forty-eight (48) inch diameter pilings and the revision sought is for up to twenty-four (24) eighty-four (84) inch diameter pilings.

Comment #2
Please explain how the 2/19/15 cover letter from the DOE to the USEPA, can indicate there are no changes to the emission estimates considering that the application for a permit modification (dated 2/26/15) indicates an increase in the amount and size of piles to be driven. An increase in the piling activity should result in a corresponding increase in construction emissions. Please explain how the emissions that would result from an increase in the size and amount of pile driving can be included in the emissions estimates in the attachment, when the attachment is dated 10/10/11 and the application for a permit modification is dated 2/26/15.

3. 2.2.4 Installation of Turbines and Foundations
The EA states, "Once assembly is completed, the foundations would be loaded onto ABS class ocean deck barges that would carry three jackets per barge. It is anticipated that the two barges would be transported by two tugs directly to the project site."

Comment #3
In the attachment (10/10/11), there is only one jacket tug listed in Table 8. Marine Travel Emissions. Please clarify if a second tug is required to transport the jacket foundations to the project site. Please clarify if the emissions for two tugs have been included in the emission estimates in Table 8. Marine Travel Emissions in the attachment (10/10/11) and in Table 3-2 Comparison of Construction Emissions to Conformity Applicability Levels in the Draft EA.

4. The Draft EA states, "The turbines and associated major components are envisioned to be delivered to the Beckett Street Marine Terminal in Camden, New Jersey."

Comment #4

Please clarify if the emissions from the transportation of the turbines to the Beckett Street Marine Terminal have been included in Table 1. Comparison of Construction Emissions to Conformity Applicability Levels in the attachment (10/10/11) and in Table 3-2 Comparison of Construction Emissions to Conformity Applicability Levels in the Draft EA.

5. The Draft EA states, "The steel turbines would be manufactured domestically and transported to the staging area at Beckett Street Marine Terminal via barge, rail, and/or truck."

Comment #5

Please clarify if the emissions from the transportation of the steel turbines to the staging area at Beckett Street Marine Terminal have been included in Table 1. Comparison of Construction Emissions to Conformity Applicability Levels in the attachment (10/10/11) and in Table 3-2 Comparison of Construction Emissions to Conformity Applicability Levels in the Draft EA.

6. The Draft EA states, "The foundations would be fabricated at a Gulf of Mexico facility and then transported by barge to the staging area at Beckett Street Marine Terminal."

Comment #6

Please clarify if the emissions from the transportation of the foundations to the staging area at Beckett Street Marine Terminal have been included in Table 1. Comparison of Construction Emissions to Conformity Applicability Levels in the attachment (10/10/11) and in Table 3-2 Comparison of Construction Emissions to Conformity Applicability Levels in the Draft EA.

For any additional questions, please contact Angela Skowronek at (609) 984-0337

The Bureau of Mobile Sources has reviewed the Draft Environmental Assessment (EA) for the Fishermen's Atlantic City Windfarm (February 2015) and has the following comments:

Diesel exhaust contributes the highest cancer risk of all air toxics in New Jersey and is a major source of NOx within the state. Therefore, NJ DEP recommends that construction projects involving non-road diesel construction equipment operating in a small geographic area over an extended period of time implement the following measures to minimize the impact of diesel exhaust:

1. All on-road vehicles and non-road construction equipment operating at, or visiting, the construction site shall comply with the three minute idling limit, pursuant to N.J.A.C. 7:27-14 and N.J.A.C. 7:27-15. Consider purchasing "No Idling" signs to post at the site to remind contractors to comply with the idling limits. Signs are available for purchase

from the Bureau of Mobile Sources at 609/292-7953 or http://www.stopthesoot.org/sts-no-idle-sign.htm.

2. All non-road diesel construction equipment greater than 100 horsepower used on the project for more than ten days should have engines that meet the USEPA Tier 4 non-road emission standards, or the best available emission control technology that is technologically feasible for that application and is verified by the USEPA or the CARB as a diesel emission control strategy for reducing particulate matter and/or NOx emissions.

3. All on-road diesel vehicles used to haul materials or traveling to and from the construction site should use designated truck routes that are designed to minimize impacts on residential areas and sensitive receptors such as hospitals, schools, daycare facilities, senior citizen housing, and convalescent facilities

For any additional questions, please contact Jeff Cantor at (609) 984-0337

Thank you for giving the New Jersey Department of Environmental Protection the opportunity to comment on the Draft Environmental Assessment for the proposed Fisherman's Atlantic City Windfarm. If you have any additional questions, please contact our office at (609-292-3600.

Sincerely,

Ruth W. Foster, PhD., P.G. Acting Director
Office of Permit Coordination
and Environmental Review

Enclosure

C: John Gray, NJDEP-PCER
Angela Skowronek, NJDEP-Air Quality Planning
Peg Hanna; Jeff Cantor – NJDEP-Air Mobile Sources
Kelly Davis, NJDEP – NHRG - Fish and Wildlife
Brandon Muffley – NHRG - Marine Fisheries
Jesse West-Rosenthal, NJDEP - Historic Preservation
Stephen Myers, NJDEP – Smart Growth and Green Energy
Janet Stewart - Land Use Regulation
Jane Uptegrove, NJDEP-NJ Geological and Water Survey
Richard Castagna, NJDEP-Tidelands
Samuel Reynolds, Nicole Minnichbach, US Army Corp of Engineers

APPENDIX E

USACE PERMIT

June 8, 2012

(Modification to be issued after completion of this EA)

FISHERMEN'S ENERGY, LLC
P. O. Box 555
CAPE MAY, NJ 08204 USA
609-286-9650
www.fishermensenergy.com

June 8, 2012

Lawrence M. Slavitter
U.S. Army Corps of Engineers
Wanamaker Building
100 Penn Square East
Philadelphia, PA 19107-3390

RE: RETURN OF SIGNED ORIGINAL PERMT; CENAP-OP-R-2008-0777-39; FISHERMEN'S ENERGY INSTATE WATERS OFFSHORE WIND FARM PROJECT

Dear Mr. Slavitter:

As requested in the U.S. Army Corps of Engineers (USACOE) correspondence dated May 31, 2012, Fishermen's Energy of New Jersey, LLC (FE) is pleased to return the signed copy of the Draft Initial Proffered Department of the Army permit. Further, I have included a check in the amount of $100.00 made out to FAO, USAED, Philadelphia District, for processing.

FE reserves the right to approach the USACOE for modifications to the permit and its special permit conditions, should changes in the design of the project be required based on additional financial, environmental, or constructability issues identified prior to the actual construction of the wind farm.

It is our pleasure to have worked with you on this project and we appreciate the Corp's assistance in bringing this project to fruition. If you have any further questions, please do not hesitate to call me at (609) 286-9650. Thank you.

Sincerely,

Daniel Cohen
President

cc: Chris Wissemann; Fishermen's Energy
Rhonda Jackson; Fishermen's Energy
Charles Harman; AMEC

DEPARTMENT OF THE ARMY PERMIT

PERMITTEE AND PERMIT NUMBER:

CENAP-OP-R-2008-0777-39
Fishermen's Energy of New Jersey, LLC

ISSUING OFFICE:

Department of the Army
U.S. Army Corps of Engineers, Philadelphia District
Wanamaker Building - 100 Penn Square East
Philadelphia, Pennsylvania 19107-3390

NOTE: The term "you" and its derivatives, as used in this permit, means the permittee or any future transferee. The term "this office" refers to the appropriate district or division office of the Corps of Engineers having jurisdiction over the permitted activity or the appropriate official of that office acting under the authority of the commanding officer.

You are authorized to perform work in accordance with the terms and conditions specified below.

PROJECT DESCRIPTION:

The project involves the installation of six (6) offshore wind turbines. The following activities will be performed in association with the installation of the turbines:

Pile driving of eighteen (18) forty eight (48) inch diameter pipes placed in the openings on the three ends of the jacketed foundation struction. The pole and neucelle will be attached to the jacketed foundation, comprising the turbine structure.

Placement of approximately four (4) to six (6) inch filter stone and twelve (12) to fifteen (15) inch armor stone around each of the six (6) turbines.

Installation of cables, four and one half (4.5) inch in diameter will run in series from the outermost turbines to turbine number 3. The cables between the turbines will be installed using a jet plow that will jet the cable into the substrate. The proposed cables will be buried to a depth of approximately nine (9) feet below existing grade. From turbine number 3, one eight (8) inch in diameter cable will carry all of the electricity from the proposed 6 turbines, in alternating current at 35 kV, 600 Amps, to a location approximately eighteen hundred (1800) feet from the shoreline. A cable will be directionally drilled from shore to connect to the cable from the turbines.

All work is to be completed in accordance with the attached plan(s) E-1 through E-18.

PROJECT LOCATION:

Within the Atlantic Ocean, approximately 2.8 nautical miles east of Atlantic City, Atlantic County, New Jersey.

PERMIT CONDITIONS:

General Conditions:

1. The time limit for completing the work authorized ends on 31 December 2015. If you find that you need more time to complete the authorized activity, submit your request for a time extension to this office for consideration at least one month before the above date is reached.

2. You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification of this permit from this office, which may require restoration of the area.

3. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and State coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

4. If you sell the property associated with this permit, you must obtain the signature of the new owner in the space provided and forward a copy of the permit to this office to validate the transfer of this authorization.

5. If a conditioned water quality certification has been issued for your project, you must comply with conditions specified in the certification as special conditions to this permit. For your convenience, a copy of the certification is attached if it contains such conditions.

6. You must allow representatives from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of your permit.

Special Conditions:

1. All work performed in association with the above noted project shall be conducted in accordance with the project plans entitled "Fisherman's Energy Project…", prepared by AMEC Earth and Environmental Incorporated, dated April 19, 2011, last revised July 7, 2011, sheets C-1 through C-9. Additionally, the drawing entitled "Wind Turbine Detail", prepared by AMEC Earth and Environmental, Incorporated, dated January 11, 2012, unrevised, Figure 1; and finally the

drawing entitled "Figure 1 Overall Site Plan", prepared by AMEC Earth and Environmental, Incorporated, dated July 12, 2011, unrevised, sheet number 1. The project plans provide for the installation of six (6) offshore wind turbine generators that will generate a maximum of approximately twenty five (25) megawatts of electricity off the New Jersey coast, near Atlantic City. The turbines will be spaced approximately two thirds (0.667) of a mile apart. The turbines will be installed using a jack-up barge, standing on the ocean floor with steel legs attached to the vessel. Cranes and other equipment needed for the installation of the turbines, and attendant features, will be staged on the barge. A "jacketed" foundation will be lowered to the ocean floor using the equipment on the barge. This triangular shaped structure has fifty two (52) inch diameter openings for each leg. The cross braces of the tower will measure approximately forty nine (49) feet in length and eighteen (18) inches in diameter to support the tower. The jacketed foundation will be securred to the ocean floor using three (3) forty eight (48) inch diameter pipes placed in the openings on the three ends of the structure. The piles will be installed using a hydraulic pile driving hammer. The piles will be drive to a depth of one hundred fifty (150) feet below the mudline. The foundation will taper from the ocean floor to the top of the foundation located approximately forty six (46) feet above the waterline. The structure will be stabilized by static rock scour protection, placed around the entire strucucture. Each foundation/scour pad will impact approximately seven tenths (0.7) of an acre of the waterway. The foundation will be connected to a necelle, which houses the turbine unit, by a connecting tower. The center point of the blade hub will be located approximately three hundred six (306) feet above the surface of the water, at mean high water. The blade hub will be installed on the face of the nacell, with the three (3) approximately one hundred ninety two (192) foot long blades installed into the hub. The blade at its lowest point will be located approxmately one hundred seventeen (117) feet above the surface of the water and approximately four hundred ninty four (494) feet above the surface of the water at its highest point at mean high water

Electrical cables will run from the nacelle, into a J-tub, with the tube extending from the bottom of one of the 3 section of the "jacketed" foundation, to the ocean floor. The cables, four and one half (4.5) inch in diameter will run in series from the outermost turbines to turbine number 3. The cables between the turbines will be installed using a jet plow that will jet the cable into the substrate. The proposed cables will be buried to a depth of approximately nine (9) feet below existing grade. From turbine number 3, one eight (8) inch in diameter cable will carry all of the electricity from the proposed 6 turbines, in alternating current at 35 kV, 600 Amps, to a location approximately eighteen hundred (1800) feet from the shoreline. The cable will be installed with the same jet plow that will install the cable between the turbines, to the same approximately nine (9) foot depth. Horizontal directional drilling (HDD) equipment would be placed within a vault, staged just behind the boardwalk at the foot of Tennessee Avenue, in an area of the roadway/in an existing parking lot. The subterranean vault, eight (8) feet by twenty (20) feet by six (6) feet in depth will be constructed below grade in the street as close to the boardwalk as physically possible. HDD will be used to install the cable at a depth of approximately twenty seven feet below the sea floor, rising to approximately nine (9) feet below the sea floor at a transition point approximately eighteen hundred (1800) feet off-shore. The pipe placed in the ground by the HDD process would accept the cable from the off shore operation. At that off shore site, a 15' square area will be excavated into the sand. The cable would be installed nine (9) feet below the sea floor using jet plow technology up to the transition point. At that point, the cable will route through a transition flange at the end of the eighteen hundred (1800) foot pipe from shore which will "accept" the submarine cable and that pipe will be used to route the cable to the on-shore vault. The land-based cable will then run under Tennessee Avenue and terminatinge at the Huron Substation owned and operated by Atlantic City Electric. The cable running to the Huron Substation will be installed using HDD equipment and will be installed approximately twenty five (25) to seventy (70) feet below the surface of Tennessee Avenue. Depth to be determined by the operator of the HDD based on existing site conditions.

The expected life of the wind turbine is twenty five (25) years. At that time, barges would be sent to the site to remove the tower from the foundation. The piles securing the foundation will be cut approxiamtely fifteen (15) feet below the mudline and the structure placed on the barge for disposal. Another potential alternative would be to place a new necelle on top of the tower. The decision will be made at the end of the life expectancy for the necelle. The stated purpose of the project is to provide for install wind turbines and operate a nominal 25-MW offshore wind farm to be located in waters of the State of New Jersey to generate; supply renewable non-greenhouse gas polluting energy to the PJM grid; and to serve as a demonstration project for off-shore wind projects pursuant to the NJ Blue Ribbon Panel Final Report and the NJ Energy Master Plan.

2. Construction activities shall not result in the disturbance or alteration of greater than 5 acres of waters of the United States.

3. Any deviation in construction methodology or project design from that shown on the above noted drawings must be approved by this office, in writing, prior to performance of the work. All modifications to the above noted project plans shall be approved, in writing, by this office. No work shall be performed prior to written approval of this office.

4. This office shall be notified at least 10 days prior to the commencement of authorized work by completing and signing the attached *Notification/ Certification of Work Commencement Form*. This office shall also be notified within 10 days of the completion of the authorized work by completing and signing the attached *Notification/Certification of Work Completion/Compliance Form*. All notifications required by this condition shall be in writing and shall be transmitted to this office by registered mail. Oral notifications are not acceptable. Similar notification is required each time maintenance work is to be done under the terms of this Corps of Engineers permit.

5. The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration

6. The turbines shall be marked and/or lighted in accordance with the Federal Aviation Administration (FAA) Advisory circular 70/7460-1 K Change 2, Obstruction Marking and Lighting, white paint/synchronized red lights – Chapters 4, 12, and 13 (Turbines).

7. FAA form 7460-2, Notice of Actual Construction or Alteration, must be completed and returned to FAA, Air Traffic Airspace Branch, ASW – 520, 2601 Meacham Boulevard, Fort

Worth, Texas 76137 within 5 days after construction reaches its greatest height (7460-2, Part II). A copy of the cover letter will be sent to this office for our records.

8. If any unanticipated discoveries of historic properties, archaeological sites or human remains are encountered during the implementation of this permit action, the permittee shall suspend work in the area, secure the area from further impacts and contact the Cultural Resource Specialist/Tribal Liaison of the Philadelphia District, US Army Corps of Engineers within 24 hours of the discovery. The permittee shall supply this office with the location and type of resource uncovered during construction activities. The Corps will initiate Federal, state and Tribal coordination and determine appropriate treatment of the discovery. Written approval is needed prior to resumption of construction activities within the project site.

9. Per United States Coast Guard (USCG) requirements, and as shown on Plan E-10, the tower supporting the nacelle shall be marked as follows:

a. All structures will require lighting to be visible 360 degrees and have an availability rate of at least 99 %.

b. All structures will be required to be painted yellow, Munsell Chip 2.5 Y 8/12, from the mean low water line to 50 feet mean high water (MHW). Each structure will be required to have a unique alpha identifier, "FA" through "FF" with "F" representing Fishermans Energy. The letters shall be black, Federal color no. 27038, at least 15 inches in height, located 120 degrees apart with the letters mounted vertically. Lights shall be placed at 30 feet MHW, with the alpha identifiers located beneath/lower than the light. Above and below the light/alpha identifiers will be a yellow, three (3) foot wide retro reflective material stripe, completing encircling the monopole.

c. The monopoles labeled "FA" and "FF" (turbines 1 and 6) shall be considered Significant Peripheral Structures, requiring amber flashing lights with an operational range of 4 nautical miles and synchronously flashed with an ISO 2, yellow characteristic. The effect will be that all lights on structures "FA" and "FF" flash synchronously.

d. Structures "FB" through "FE" will display identical color coating and retro reflective materials as structures "FA" and "FF", however, the operational range for the lights will be 2 nautical miles. Any other slow flashing amber characteristic can be displayed and need not be synchronously flashed.

10. Within 90 days of the date of this permit, the permittee shall contact the USCG to commence with the establishment of an Operations Center that can be contacted by the USCG to ensure that the turbines do not impact potential search and rescue missions that may occur within the project area. Once completed, a copy of the protocol shall be submitted to this office for our records. No work can commence within areas of Federal jurisdiction until the office receives a copy of the USCG approved documents for our records.

11. A minimum of 10 days prior to commencing work, the permittee/contractor shall request in writing, from the U.S. Coast Guard, that a Local Notice to Mariners be issued regarding the authorized construction work. This written request shall include the location of work, a description of the construction activities; type of construction equipment to be used and expected duration of work in the waterway. The written request should be addressed to the following:

Commander, Fifth Coast Guard District, Aids to Navigation Branch, Federal Building, 431 Crawford Street, Portsmouth, Virginia 23704-5004, FAX Number 804-398-6303. A copy of the cover letter shall be forward to our office for our records.

12. Within 60 days after completion of the work, the permittee shall furnish the Corps and National Oceanic and Atmospheric Administration, Nautical Data Branch, N/CS 26, Station 7230, 1315 East-West Highway, Silver Spring, Maryland 20910-3282, with certification that the turbines and associated cables have been installed in compliance with the approved plans. The certification shall include a survey, conducted by a licensed surveyor, which clearly shows the elevations and alignment of the turbines and cable across the waterway. Any discrepancies shall be clearly noted. A copy of the cover letter shall be forward to our office for our records.

13. This permit does not authorize any dredging at any of the sites to be used for transporting/storage of equipment in Camden New Jersey or Atlantic City, New Jersey.

14. The permittee is required to notify Mr. Keith Watson, (Absecon Inlet Project Manager) at 215-656-6287 , a minimum of 6 weeks prior to any construction or maintenance activities within the overall limits of the Corps sand borrow area as shown on the attached drawing E-18.

15. Mitigation, monitoring and reporting requirements shall be implemented by the permittee during the conduct of the installation of the wind turbine jacketed foundation. Additional detail on how these measures will be implemented is described in the MMS Gulf of Mexico (GOM) NTL No. 2007-G02 (see http://www.gomr.mms.gov/homepg/regulate/regs/ntls/2007NTLs/07-g02.pdf), or superseding NTL. Although this NTL focuses on seismic surveying with air guns in the GOM, the methodologies described in the NTL for exclusion-zone monitoring, ramp up and shut down as the same as those that will be required under this proposed action. All reports generated shall be submitted to this office once completed.

16. A 1250 meter (4100 feet) radius exclusion zone for listed marine mammals and sea turtles will be established around the pile of the jacketed foundation being installed in order to reduce the potential for serious injury or mortality of these species. The exclusion zone around the turbine support vessels must be monitored for the presence of listed marine mammals or sea turtles before, during and after any pile driving activity. The exclusion zone will be monitored for 60 minutes prior to the ramp up of the hydraulic hammer. If the exclusion zone is obscured by fog or poor lighting conditions, work will not be initiated until the entire exclusion zone is visible for the 60 minute period. If listed marine mammals or sea turtles are observed within the zone during the 60 minute period and before the ramp up begins, pile driving will be delayed until they move out of the area and until at least an additional 60 minutes have passed without a listed marine mammal or sea turtle sighting. Monitoring of the zone will continue for 60 minutes following completion of the pile driving.

17. To allow any unobserved marine mammals and sea turtles to leave the project area, a "soft start", which involves having the hammer commencing work at half power, shall be employed, for a minimum of 15 minutes. After this time period, the hammer can be used at full power unless a marine mammal or sea turtle is seen within the exclusion zone.

18. If a listed marine mammal or sea turtle is spotted within or transiting towards the exclusion

zone surrounding the turbines and the work vessels, an immediate shutdown of the equipment will be required. Subsequent restart of the hydraulic hammer will be allowed following clearance of the exclusion zone and the implementation of the start-up procedures as noted above.

19. All pile driving equipment will comply with applicable equipment noise standards of the US Environmental Protection Agency, and all equipment will have noise control devices no less effective than those provided on the original equipment.

20. Monitoring of the exclusion zones will be conducted by qualified NMFS-approved observer(s). Observer qualifications will include direct field experience on a marine mammal/sea turtle observation vessel and/or aerial surveys in the Atlantic Ocean. All observers will receive NMFS-approved marine mammal observer training and be approved in advance by NMFS after a review of their qualifications. Visual observations will be made using binoculars or other suitable equipment during daylight hours. Data on all observations will be recorded based on standard marine mammal observer collection data. This will include: dates and locations of construction operations; time of observation, location and weather; details of marine mammal sightings (e.g., species, numbers, behavior); and details of any observed taking (behavioral disturbances or injury/mortality). Any significant observations concerning impacts on listed marine mammals or sea turtles will be transmitted to NMFS and the Corps within 48 hours. Any observed takes of listed marine mammals or sea turtles resulting in injury or mortality will be immediately reported to NMFS and US Army Corps of Engineers.

21. The following reports must be submitted during pile driving activities:

a. A report will be provided to the NMFS and the Corps within 90 days of the commencement of pile driving activities that includes a summary of the work and monitoring activities and an estimate of the number of listed marine mammals and sea turtles that were observed during pile driving activities. The report will include information, such as: dates and locations of operations, details of listed marine mammal or sea turtle sightings (dates, times, locations, activities, associated work), and estimates of the amount and nature of listed marine mammal or sea turtle takings.

b. Any observed injury or mortality to a listed marine mammal or sea turtle must be reported to the NMFS and the Corps within 24 hours of observation. Any significant observations concerning impacts on listed marine mammals or sea turtles will be transmitted to NMFS and the Corps within 48 hours.

22. The permittee shall develop, within 180 days of the date of the estimated commence of work at the site, a draft protocol to be followed by all vessel captains and aircraft pilots to ensure that marine mammals and sea turtles will not be harassed during project implementation. The following references: (1) NOAA Fisheries Northeast Regional Viewing Guidelines, as updated through the life of the project http://www.nmfs.noaa.gov/pr/pdfs/education/viewing_northeast.pdf); and (2) MMS Gulf of Mexico Region's NTL No. 2007-G04 (http://www.gomr.mms.gov/homepg/regulate/regs/ntls/2007NTLs/07-g04.pdf), or any

superseding NTL are supplied for your use in developing this document. The draft protocol will submitted to the Corps and the NMFS for review and approval prior to regulated work being initiated.

23. All vessel and aircraft operators shall undergo training to ensure they are familiar with the guidance above. These training requirements must be written into any contractor agreements. The permittee shall supply this office with written verification that all vessel captains and aircraft pilots have undergone the training.

24. All personnel and contractors will be advised that there are civil and criminal penalties for harming, harassing, or killing marine mammals and sea turtles, which are protected under the Endangered Species Act.

25. All vessels associated with the project will operate at idle speed at all times while in shallow waters where the draft of the vessel provides less than a four foot clearance form the bottom.

26. Any collision with **any** marine mammal or sea turtle must be reported to both this office and the National Marine Fisheries Service. More information can be found at http://www.nmfs.noaa.gov/pr/shipstrike/msr/.

a. Vessels transiting MSR areas are required to report their course, speed, position, destination, and route to the US Coast Guard upon entry into the reporting area. Vessels should report via INMARSAT C to one of the following addresses:
E-mail RightWhale.MSR@noaa.gov or Telex: 236737831. Vessels not equipped with INMARSAT C should report via alternate satellite communications equipment to one of the following addresses:
e-mail RightWhale.MSR@moaa.gov or Telex:236737831. Vessels unable to use satellite communications equipment should contact the US Coast Guard Communication Area Master Station, Chesapeake, Virginia via SITOR/NBDP on 8426.3 kHz, 16817.8 kHz twenty four hours per day, or 6314.3 kHz from 2300 GMT until 1100 GMT and 22387.8 kHz from 1100 GMT until 2300 GMT.

b. Vessels unable to use satellite communications or SITOR/NBDP shall contact the US Coast Guard Communication Area Master Station, Chesapeake, Virginia via published voice frequencies.

c. Mariners can learn more about steps to avoid collisions with whales at: http://www.nmfs.noaa.gov/pr/pdfs/shipstrike/marinersweatherlog_shipstrike.pdf.

27. All monitoring protocols as outlined in the document entitled "Post-Construction Avian, Bat, and Marine Mammals Studies Fishermen's Energy State Waters Wind Power Project", dated March 23, 2012, shall be followed in full, including submittal of reports to both the Corps and the NMFS.

28. The applicant will schedule yearly meetings that will be held every January. The yearly meetings will include the permittee, the National Marine Fisheries Service, and the Corps. The yearly meetings will take place for a minimum of 5 years, and will be held to discuss/address

project related issues that may be impacting marine mammals and sea turtles. An additional meeting will be held in January for a minimum of 5 years between the permittee, the US Fish and Wildlife Service and the Corps. A minimum of 30 days prior to the meetings, the permittee shall supply both all the Federal agencies with copies of the monitoring reports as specified in the Post Construction Monitoring Plan (see below). The Corps reserves the right to modify/extend the post-construction monitoring based on the results of the above referenced reports.

29. None of the lighting on the towers shall operate/illuminate in a continuous fashion unless specifically directed by the US Coast Guard and/or the Federal Aviation Administration. Unless required, any continuously operating/illuminating light shall be repaired or replaced within 7 days of being detected. This office shall be notified if any of the lights malfunction and confirm repair/replacement of the lighting structure within 30 days of the date of the malfunction.

30. The wind turbines and all related support systems will be monitored and maintained 24/7 by personnel manning the land-based facility control center. On duty personnel will be responsible for monitoring visibility forecasts distributed by the National Weather Service, as well as data received from the onsite visibility sensing system.

31. All turbines shall be shut down between March 15 and June 15, and between August 1 and October 31 of any year, if the following weather conditions are detected:

- If visibility in the area is less than 0.6 miles and/or overcast sky at or below the top of the turbine rotor sweep (500 feet above mean high water).
- If the forecast for the project area does not anticipate weather conditions to drop below the above referenced thresholds, but the turbine sensors on site detect poor visibility conditions for more than 2 consecutive hours, the turbines will be shut down until such time that the conditions improve to above threshold levels for 2 consecutive hours.
- If the forecast for the project area does anticipate weather conditions to drop below the above referenced conditions for a period of greater than 6 hours, the turbines will be shut down once the sensors on site detect poor visibility conditions at the turbine field. Once site conditions have improved to above threshold levels for 2 consecutive hours, the turbines may be restarted.

32. If maintenance work is required, between May 15 and November 30 of any year, that would disturb the beach/dune areas east of Tennessee Avenue and landward of mean high water, a survey of the beach/dune area for the presence of Seabeach Amaranth shall be performed and the results sent to the Corps of Engineers and the US Fish and Wildlife Service for review. No work shall be performed in the beach/dune areas until written approval is received by the permittee from this office.

33. Post construction monitoring of the turbines shall be performed as outlined in the document entitled Post – Construction Avian, Bat and Marine Mammal Studies Fishermen's Energy State Waters Wind Power Project, prepared by Geo-Marine Incorporated, Curry and Kerlinger, LLC and North East Ecological Services, dated March 23, 2012. All reports as noted in the document shall be supplied to this office, the US Fish and Wildlife Service, Pleasantville Field Office and the National Marine Fisheries Service, Gloucester Massachusetts Regional Office for review. This office reserves the right to modify the stipulations in this document, including the time frame for

acquiring data, based on the information submitted to this office for review.

34. The permittee shall notify the Philadelphia District of the Corps at least eighteen (18) months prior to decommissioning of the turbines to discuss what authorizations will be required for the work associated with the removal of the turbines.

FURTHER INFORMATION:

1. Congressional Authorities: You have been authorized to undertake the activity described above pursuant to:

X Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403).

X Section 404 of the Clean Water Act (33 U.S.C. 1344).

☐ Section 103 of the Marine Protection, Research and Sanctuaries Act.

2. Limits of this authorization.

a. This permit does not obviate the need to obtain other Federal, State, or local authorizations required by law.

b. This permit does not grant any property rights or exclusive privileges.

c. This permit does not authorize any injury to the property or rights of others.

d. This permit does not authorize interference with any existing or proposed Federal projects.

3. Limits of Federal Liability. In issuing this permit, the Federal Government does not assume any liability for the following:

a. Damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes.

b. Damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the United States in the public interest.

c. Damages to persons, property, or to other permitted or unpermitted activities or structures caused by the activity authorized by this permit.

d. Design or construction deficiencies associated with the permitted work.

e. Damage claims associated with any future modification, suspension, or revocation of this permit.

4. Reliance on Applicant's Data. The determination of this office that issuance of this permit is

not contrary to the public interest was made in reliance on the information you provided.

5. Reevaluation of Permit Decision. This office may reevaluate its decision on this permit at any time the circumstances warrant. Circumstances that could require a reevaluation include, but are not limited to, the following:

a. You fail to comply with the terms and conditions of this permit.

b. The information provided by you in support of your permit application proves to have been false, incomplete, or inaccurate (see 4 above).

c. Significant new information surfaces which this office did not consider in reaching the original public interest decision.

Such a reevaluation may result in a determination that it is appropriate to use the suspension, modification, and revocation procedures contained in 33 CFR 325.7 or enforcement procedures such as those contained in 33 CFR 326.4 and 326.5. The referenced enforcement procedures provide for the issuance of an administrative order requiring you to comply with the terms and conditions of your permit and for the initiation of legal action where appropriate. You will be required to pay for any corrective measures ordered by this office, and if you fail to comply with such directive, this office may in certain situations (such as those specified in 33 CFR 209.170) accomplish the corrective measures by contract or otherwise and bill you for the cost.

6. Extensions. General Condition 1 establishes a time limit for the completion of the activity authorized by this permit. Unless there are circumstances requiring either a prompt completion of the authorized activity or a reevaluation of the public interest decision, the Corps will normally give favorable consideration to a request for an extension of this time limit.

Your signature below, as permittee, indicates that you accept and agree to comply with the terms and conditions of this permit.

June 8, 2012

(PERMITTEE)
Daniel Cohen PRESIDENT

(DATE)

This permit becomes effective when the Federal official, designated to act for the Secretary of the Army, has signed below.

(District Engineer) (DATE)
Frank J. Cianfrani, Chief, Regulatory Branch

for: Philip M. Secrist, III
Lieutenant Colonel, Corps of Engineers
District Commander

When the structures or work authorized by this permit are still in existence at the time the property is transferred, the terms and conditions of this permit will continue to be binding on the new owner(s) of the property. To validate the transfer of this permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below.

(TRANSFEREE) (DATE)

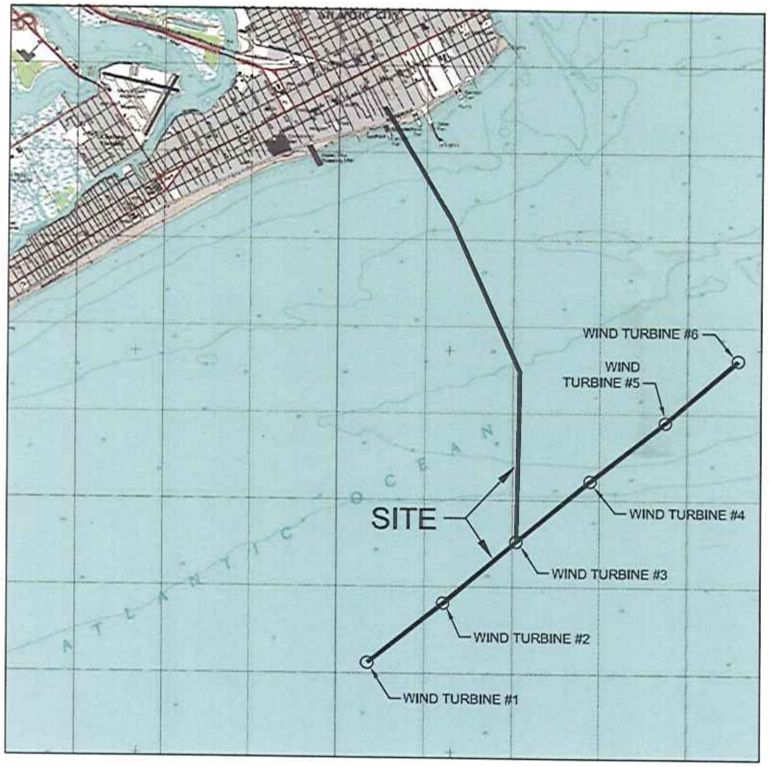
FISHERMEN'S ENERGY PROJECT

ATLANTIC CITY

ATLANTIC COUNTY, NEW JERSEY

AMEC PROJECT NO. 77523003

MAY 5, 2010 (REVISION 4 - JULY 7, 2011)



ATLANTIC CITY QUADRANGLE
ATLANTIC CITY, NEW JERSEY
SITE LOCATION MAP

SHEET INDEX

SHEET NO.	DESCRIPTION	DWG. NO.
1	COVER SHEET / INDEX	
2	INDEX PLAN - KEY PLAN	C-1
3	CABLE TO HURON SUBSTATON PLAN AND PROFILE STA. 0+00 TO 60+00	C-2
4	CABLE TO HURON SUBSTATION PLAN AND PROFILE STA. 60+00 TO 120+00	C-3
5	CABLE TO HURON SUBSTATION PLAN AND PROFILE STA. 120+00 TO 180.21	C-4
6	INTERCONNECT CABLE PLAN AND PROFILE STA. 200+00 TO 260+00	C-5
7	INTERCONNECT CABLE PLAN AND PROFILE STA 260+00 TO 320+00	C-6
8	INTERCONNECT CABLE PLAN AND PROFILE STA 320+00 TO 377.50	C-7
9	DETAILS	C-8

NOT FOR CONSTRUCTION

NO.	ISSUE / REVISION DESCRIPTION	BY	DATE
4	REVISED FOUNDATION	RM	07-07-11
3	REROUTED SUPPLY CABLE TO TURBINE #3	RM	04-19-11
2	REROUTED SUPPLY CABLE TO TURBINE #3	RM	10-22-10
1	PER ARMY CORP COMMENTS	MM	08-09-10

PROJECT:
NJDEP LAND USE PERMIT
20MW OFF SHORE WIND PROJECT
ATLANTIC CITY, NEW JERSEY

TITLE:
COVER SHEET

SEAL:

ROBERT K. MONAHAN
N.J. PROFESSIONAL ENGINEER
ENGINEER NO. GE44911

amec
EARTH & ENVIRONMENTAL, INC.
502 WEST GERMANTOWN PIKE
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FAX: (610) 828-8700
WEB: WWW.AMEC.COM

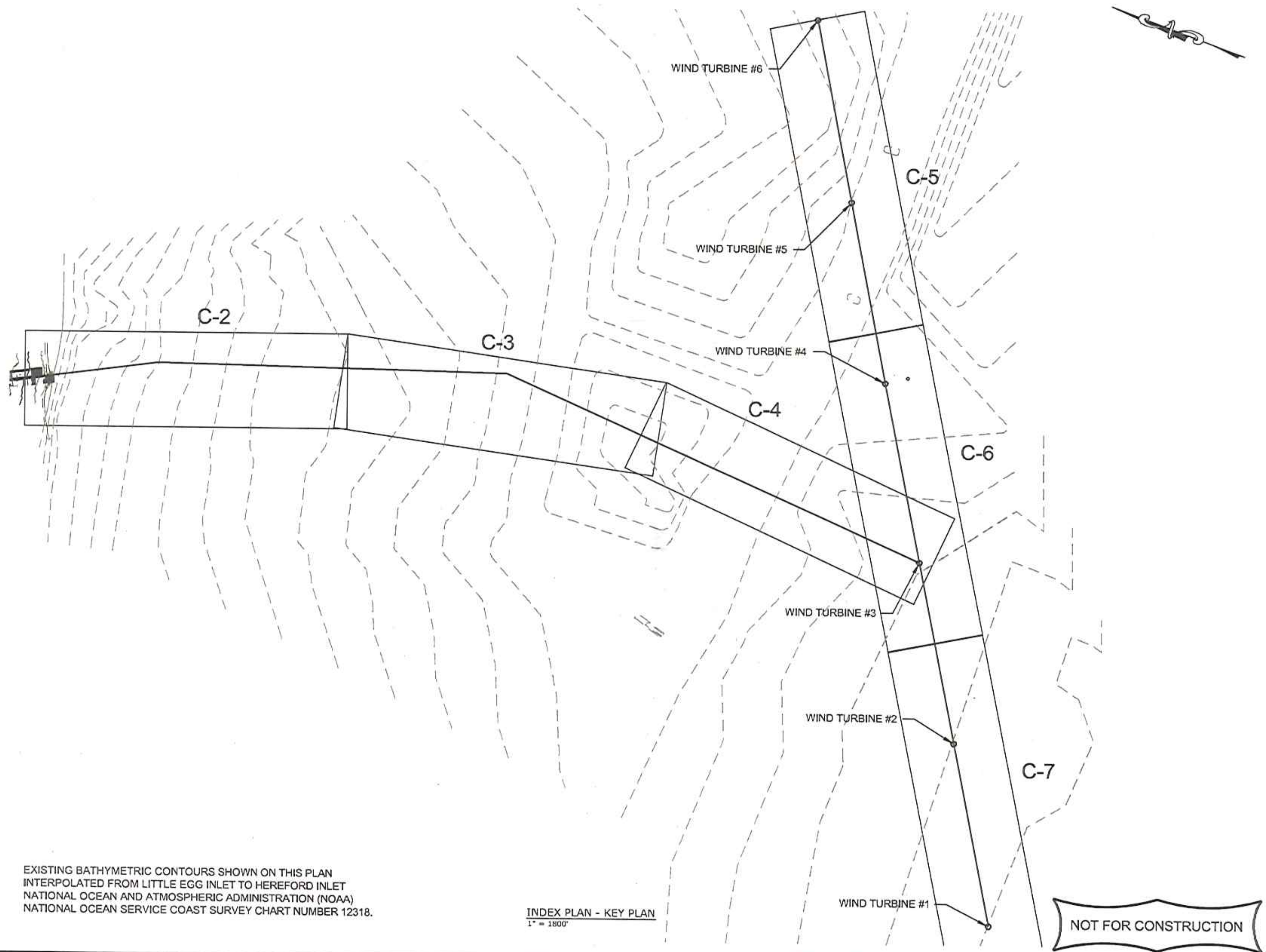
NEW JERSEY CER. OF
AUTH. NO. 24GA28010900

DESIGNED BY: DA	DRAWN BY: RJB
CHECKED BY: RM	DATE: 19 APRIL 2011
SCALE: AS SHOWN	REVISION: 3
PROJECT NUMBER: 775230003	
DRAWING NUMBER:	
SHEET NUMBER: 1 OF 9	

E-1

T:\Fishermen's Energy\07052011\Drawings from Revision 3\Fishermen's Energy Plan & Profile Rev 3.dwg • COVER • Jul. 07, 2011 4:50pm • david.blanchard

T:Fisherman's Energy/07052011\Drawings from Revision 3\Fisherman's Energy Plan & Profile Rev 3.dwg • C-1 • Jul. 07, 2011 4:45pm • david.blanchard



EXISTING BATHYMETRIC CONTOURS SHOWN ON THIS PLAN
INTERPOLATED FROM LITTLE EGG INLET TO HEREFORD INLET
NATIONAL OCEAN AND ATMOSPHERIC ADMINISTRATION (NOAA)
NATIONAL OCEAN SERVICE COAST SURVEY CHART NUMBER 12318.

INDEX PLAN - KEY PLAN
1" = 1800'

NOT FOR CONSTRUCTION

NO.	ISSUE / REVISION DESCRIPTION	BY	DATE
4	REVISED FOUNDATION	RM	07-07-11
3	REROUTED SUPPLY CABLE TO TURBINE #3	RM	04-19-11
2	REROUTED SUPPLY CABLE TO TURBINE #3	RM	10-22-10
1	PER ARMY CORP COMMENTS	MM	08-09-10

SEAL:

PROJECT:
NJDEP LAND USE PERMIT
20MW OFF SHORE WIND PROJECT
ATLANTIC CITY, NEW JERSEY

TITLE:
INDEX PLAN - KEY PLAN

ROBERT K. MONAHAN
N.J. PROFESSIONAL ENGINEER
ENGINEER NO. GE44911

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NEW JERSEY CER. OF
AUTH. NO. 24GA28010900

DESIGNED BY: DA	DRAWN BY: RJB
CHECKED BY: RM	DATE: 19 APRIL 2011
SCALE: AS SHOWN	REVISION: 3

PROJECT NUMBER:
775230003

DRAWING NUMBER:
C-1

SHEET NUMBER:
2 OF 9

E-2

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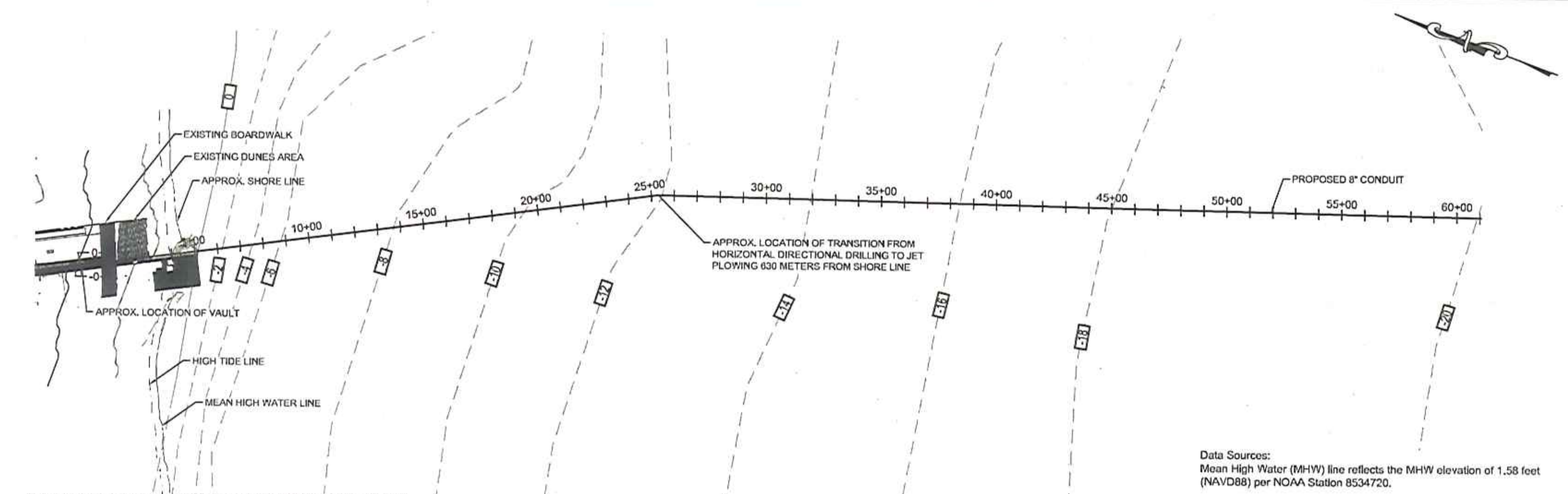


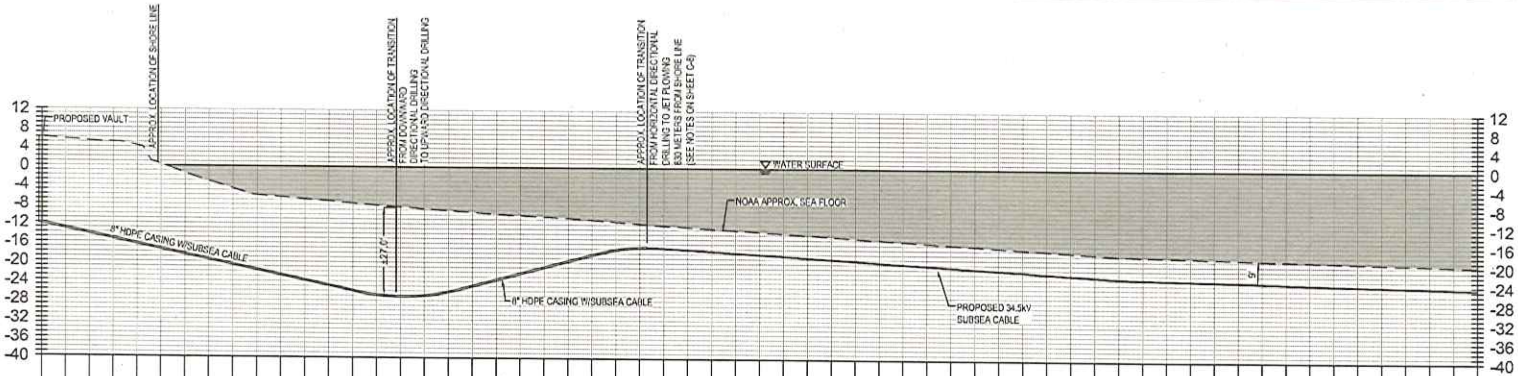
EXISTING BATHYMETRIC CONTOURS SHOWN ON THIS PLAN INTERPOLATED FROM LITTLE EGG INLET TO HEREFORD INLET NATIONAL OCEAN AND ATMOSPHERIC ADMINISTRATION (NOAA) NATIONAL OCEAN SERVICE COAST SURVEY CHART NUMBER 12318.

CABLE TO HURON SUBSTATION PLAN FROM STA 0+00 TO STA 60+00
Scale: 1" = 500'

Data Sources:
Mean High Water (MHW) line reflects the MHW elevation of 1.58 feet (NAVD88) per NOAA Station 8534720.

High Tide Line (HTL) reflects the highest predicted lunar tide limit elevation for 2004, which was established by USACE at 3.12 NAVD88.

MHW line and HTL were developed using USACE Absecon Island, New Jersey Beach Profile Data, dated December 2003.



0+00	
1+00	
2+00	
3+00	
4+00	0.00
5+00	-1.55
6+00	-3.17
7+00	-4.73
8+00	-6.08
9+00	-6.49
10+00	-6.89
11+00	-7.30
12+00	-7.71
13+00	-8.10
14+00	-8.48
15+00	-8.83
16+00	-9.18
17+00	-9.52
18+00	-9.85
19+00	-10.17
20+00	-10.42
21+00	-10.65
22+00	-11.02
23+00	-11.40
24+00	-11.79
25+00	-12.16
26+00	-12.47
27+00	-12.77
28+00	-13.08
29+00	-13.39
30+00	-13.71
31+00	-14.02
32+00	-14.33
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34+00	-14.95
35+00	-15.26
36+00	-15.57
37+00	-15.87
38+00	-16.18
39+00	-16.49
40+00	-16.80
41+00	-17.11
42+00	-17.41
43+00	-17.71
44+00	-18.00
45+00	-18.12
46+00	-18.25
47+00	-18.37
48+00	-18.49
49+00	-18.62
50+00	-18.74
51+00	-18.87
52+00	-18.99
53+00	-19.12
54+00	-19.25
55+00	-19.37
56+00	-19.50
57+00	-19.63
58+00	-19.76
59+00	-19.89
60+00	

CABLE TO HURON SUBSTATION PROFILE FROM STA 0+00 TO STA 60+00
Horiz. Scale: 1" = 500'
Vert. Scale: 1" = 10'

NOT FOR CONSTRUCTION

NO.	ISSUE / REVISION DESCRIPTION	BY	DATE
4	REVISED FOUNDATION	RM	07-07-11
3	REROUTED SUPPLY CABLE TO TURBINE #3	RM	04-19-11
2	REROUTED SUPPLY CABLE TO TURBINE #3	RM	10-22-10
1	PER ARMY CORP COMMENTS	MM	08-09-10

PROJECT:
NJDEP LAND USE PERMIT
20MW OFF SHORE WIND PROJECT
ATLANTIC CITY, NEW JERSEY

TITLE:
CABLE TO HURON SUBSTATON
PLAN AND PROFILE
STA. 0+00 TO 60+00

SEAL:

ROBERT K. MONAHAN
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NEW JERSEY CER. OF
AUTH. NO. 24GA28010900

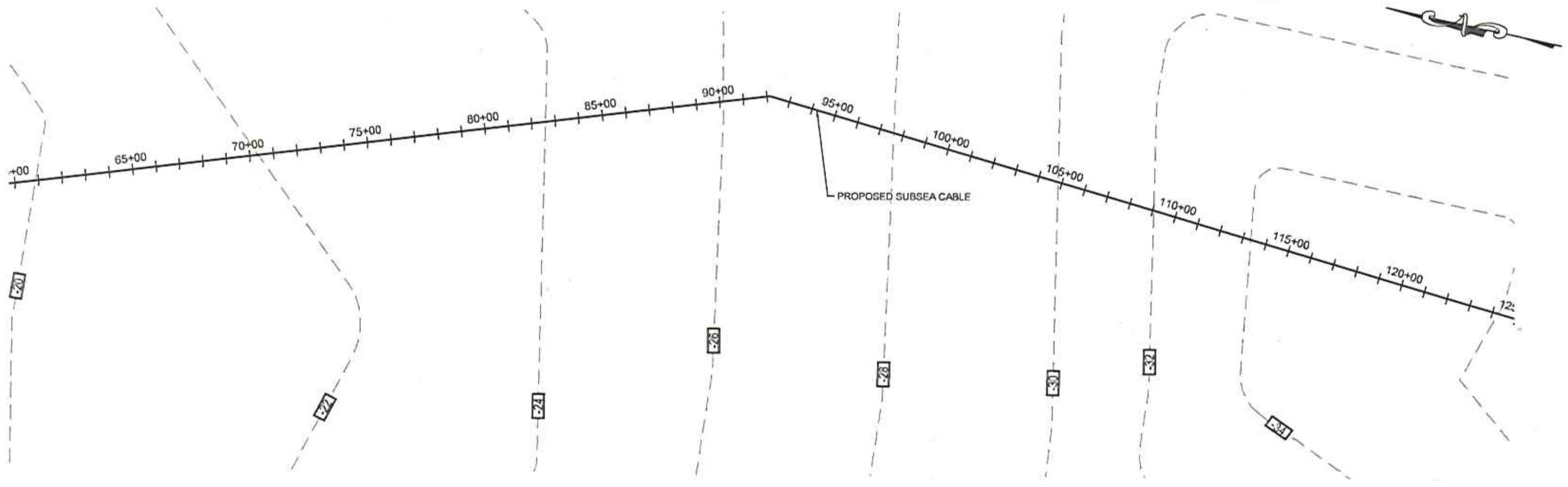
DESIGNED BY: DA	DRAWN BY: RJB
CHECKED BY: RM	DATE: 19 APRIL 2011
SCALE: AS SHOWN	REVISION: 3

PROJECT NUMBER:
775230003

DRAWING NUMBER:
C-2

SHEET NUMBER:
3 OF 9

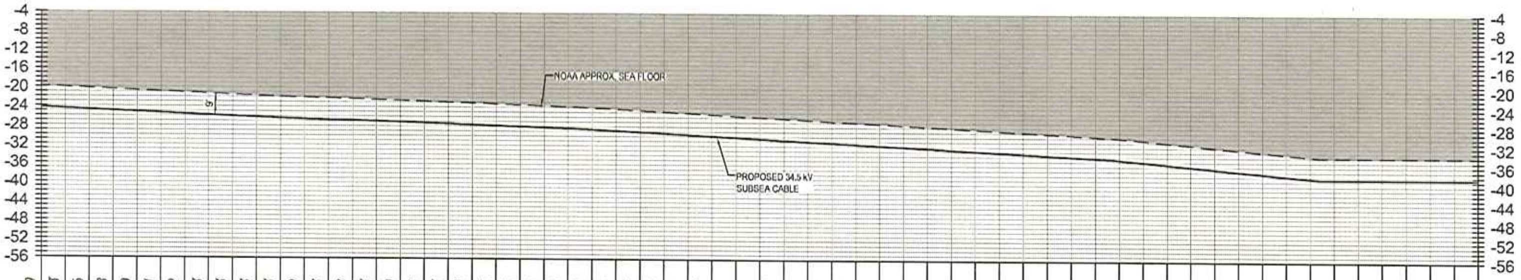
E-3



EXISTING BATHYMETRIC CONTOURS SHOWN ON THIS PLAN INTERPOLATED FROM LITTLE EGG INLET TO HEREFORD INLET NATIONAL OCEAN AND ATMOSPHERIC ADMINISTRATION (NOAA) NATIONAL OCEAN SERVICE COAST SURVEY CHART NUMBER 12318.

CABLE TO HURON SUBSTATION PLAN FROM STA 60+00 TO STA 120+00

Scale: 1" = 500'



60+00	-19.89
61+00	-20.03
62+00	-20.25
63+00	-20.48
64+00	-20.70
65+00	-20.91
66+00	-21.12
67+00	-21.33
68+00	-21.53
69+00	-21.73
70+00	-21.93
71+00	-22.09
72+00	-22.23
73+00	-22.38
74+00	-22.53
75+00	-22.70
76+00	-22.86
77+00	-23.03
78+00	-23.19
79+00	-23.36
80+00	-23.54
81+00	-23.71
82+00	-23.89
83+00	-24.11
84+00	-24.37
85+00	-24.63
86+00	-24.90
87+00	-25.16
88+00	-25.43
89+00	-25.69
90+00	-25.96
91+00	-26.23
92+00	-26.50
93+00	-26.77
94+00	-27.03
95+00	-27.30
96+00	-27.57
97+00	-27.84
98+00	-28.11
99+00	-28.39
100+00	-28.67
101+00	-28.94
102+00	-29.22
103+00	-29.50
104+00	-29.77
105+00	-30.08
106+00	-30.55
107+00	-31.03
108+00	-31.50
109+00	-31.98
110+00	-32.44
111+00	-32.90
112+00	-33.37
113+00	-33.84
114+00	-34.00
115+00	-34.00
116+00	-34.00
117+00	-34.00
118+00	-34.00
119+00	-34.00
120+00	-34.00

CABLE TO HURON SUBSTATION PROFILE FROM STA 60+00 TO STA 120+00

Horiz. Scale: 1" = 500'
Vert. Scale : 1" = 10'

NOT FOR CONSTRUCTION

NO.	ISSUE / REVISION DESCRIPTION	BY	DATE
4	REVISED FOUNDATION	RM	07-07-11
3	REROUTED SUPPLY CABLE TO TURBINE #3	RM	04-13-11
2	REROUTED SUPPLY CABLE TO TURBINE #3	RM	10-22-10
1	PER ARMY CORP COMMENTS	MM	08-09-10

PROJECT:

NJDEP LAND USE PERMIT
20MW OFF SHORE WIND PROJECT
ATLANTIC CITY, NEW JERSEY

TITLE:

CABLE TO HURON SUBSTATON
PLAN AND PROFILE
STA. 60+00 TO 120+00

SEAL:

ROBERT K. MONAHAN
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WEB: WWW.AMEC.COM

NEW JERSEY CER. OF
AUTH. NO. 24GA28010900

DESIGNED BY: DA	DRAWN BY: RJB
CHECKED BY: RM	DATE: 19 APRIL 2011
SCALE: AS SHOWN	REVISION: 3

PROJECT NUMBER:
775230003

DRAWING NUMBER:
C-3

SHEET NUMBER:
4 OF 9

E-4

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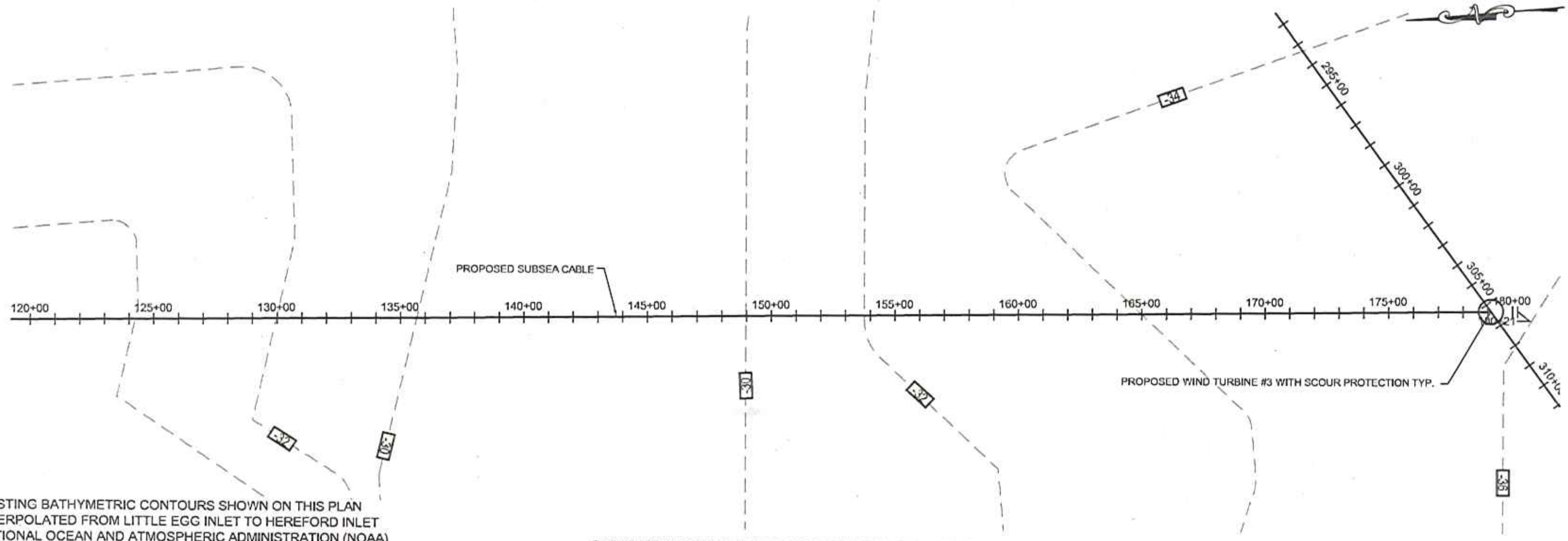
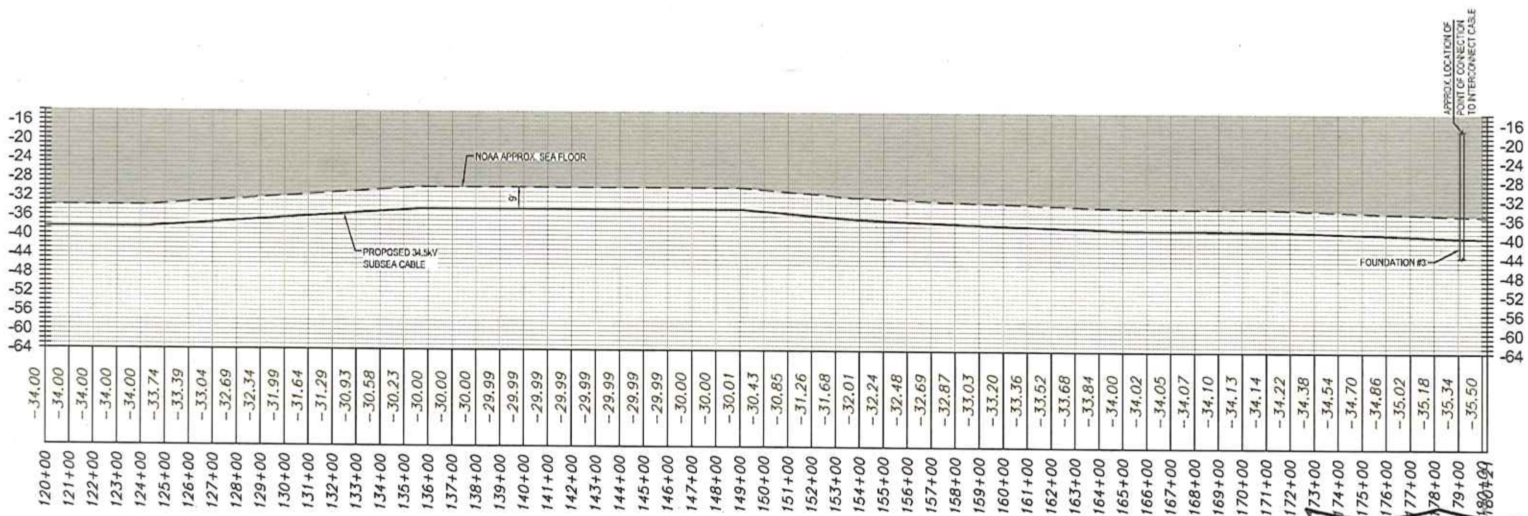


EXISTING BATHYMETRIC CONTOURS SHOWN ON THIS PLAN
INTERPOLATED FROM LITTLE EGG INLET TO HEREFORD INLET
NATIONAL OCEAN AND ATMOSPHERIC ADMINISTRATION (NOAA)
NATIONAL OCEAN SERVICE COAST SURVEY CHART NUMBER 12318.

CABLE TO HURON SUBSTATION PLAN FROM STA 120+00 TO STA 180+21
Scale: 1" = 500'



120+00	-34.00
121+00	-34.00
122+00	-34.00
123+00	-34.00
124+00	-34.00
125+00	-33.74
126+00	-33.39
127+00	-33.04
128+00	-32.69
129+00	-32.34
130+00	-31.99
131+00	-31.64
132+00	-31.29
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134+00	-30.58
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148+00	-30.00
149+00	-30.01
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151+00	-30.85
152+00	-31.26
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154+00	-32.01
155+00	-32.24
156+00	-32.48
157+00	-32.69
158+00	-32.87
159+00	-33.03
160+00	-33.20
161+00	-33.36
162+00	-33.52
163+00	-33.68
164+00	-33.84
165+00	-34.00
166+00	-34.02
167+00	-34.05
168+00	-34.07
169+00	-34.10
170+00	-34.13
171+00	-34.14
172+00	-34.22
173+00	-34.38
174+00	-34.54
175+00	-34.70
176+00	-34.86
177+00	-35.02
178+00	-35.18
179+00	-35.34
180+00 180+21	-35.50

CABLE TO HURON SUBSTATION PROFILE FROM STA 120+00 TO STA 180+21
Horiz. Scale: 1" = 500'
Vert. Scale : 1" = 10'

NOT FOR CONSTRUCTION

NO.	ISSUE / REVISION DESCRIPTION	BY	DATE
4	REVISED FOUNDATION	RM	07-07-11
3	REROUTED SUPPLY CABLE TO TURBINE #3	RM	04-19-11
2	REROUTED SUPPLY CABLE TO TURBINE #3	RM	10-22-10
1	PER ARMY CORP COMMENTS	MM	08-09-10

PROJECT:

NJDEP LAND USE PERMIT
20MW OFF SHORE WIND PROJECT
ATLANTIC CITY, NEW JERSEY.

TITLE:

CABLE TO HURON SUBSTATON
PLAN AND PROFILE
STA.120+00 TO 180.21

SEAL:

ROBERT K. MONAHAN
N.J. PROFESSIONAL ENGINEER
ENGINEER NO. GE44911

amec
EARTH & ENVIRONMENTAL, INC.
502 WEST GERMANTOWN PIKE
SUITE 850
PLYMOUTH MEETING, PENNSYLVANIA 19462
TELEPHONE: (610) 828-8100
FAX: (610) 828-6700
WEB: WWW.AMEC.COM

NEW JERSEY CER. OF
AUTH. NO. 24GA28010900

DESIGNED BY: DA	DRAWN BY: RJB
CHECKED BY: RM	DATE: 19 APRIL 2011
SCALE: AS SHOWN	REVISION: 3

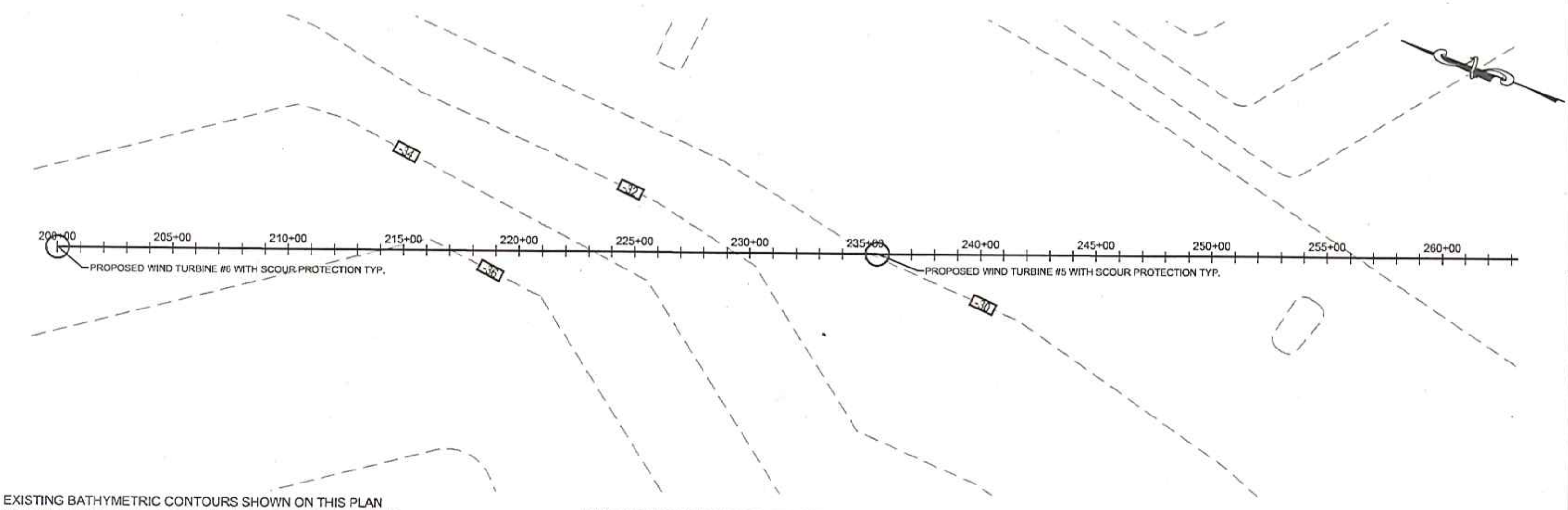
PROJECT NUMBER:
775230003

DRAWING NUMBER:
C-4

SHEET NUMBER:
5 OF 9

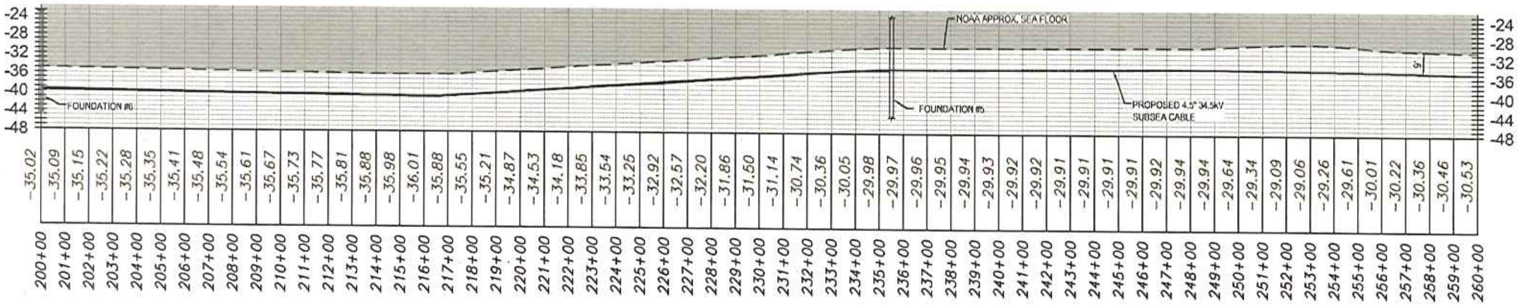
E-5

T:\Fisherman's Energy\07052011\Drawings from Revision 3\Fisherman's Energy Plan & Profile Rev 3.dwg - C-4 - Jul. 07, 2011 4:37pm - david.blanchard



EXISTING BATHYMETRIC CONTOURS SHOWN ON THIS PLAN
INTERPOLATED FROM LITTLE EGG INLET TO HEREFORD INLET
NATIONAL OCEAN AND ATMOSPHERIC ADMINISTRATION (NOAA)
NATIONAL OCEAN SERVICE COAST SURVEY CHART NUMBER 12318.

INTERCONNECT PLAN FROM STA 200+00 TO STA 260+00
Scale: 1' = 500'



INTERCONNECT PROFILE FROM STA 200+00 TO STA 260+00
Horiz. Scale: 1" = 500'
Vert. Scale: 1" = 20'

NOT FOR CONSTRUCTION

NO.	ISSUE / REVISION DESCRIPTION	BY	DATE
4	REVISED FOUNDATION	RM	07-07-11
3	REROUTED SUPPLY CABLE TO TURBINE #3	RM	04-19-11
2	REROUTED SUPPLY CABLE TO TURBINE #3	RM	10-22-10
1	PER ARMY CORP COMMENTS	MM	08-09-10

PROJECT:
NJDEP LAND USE PERMIT
20MW OFF SHORE WIND PROJECT
ATLANTIC CITY, NEW JERSEY

TITLE:
INTERCONNECT CABLE PLAN
AND PROFILE STA. 200+00 TO 260+00

SEAL:

ROBERT K. MONAHAN
N.J. PROFESSIONAL ENGINEER
ENGINEER NO. GE44911

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PLYMOUTH MEETING, PENNSYLVANIA 19462
TELEPHONE: (610) 828-8100
FAX: (610) 828-8700
WEB: WWW.AMEC.COM

NEW JERSEY CER. OF
AUTH. NO. 24GA28010900

DESIGNED BY: DA	DRAWN BY: RJB
CHECKED BY: RM	DATE: 19 APRIL 2011
SCALE: AS SHOWN	REVISION: 3

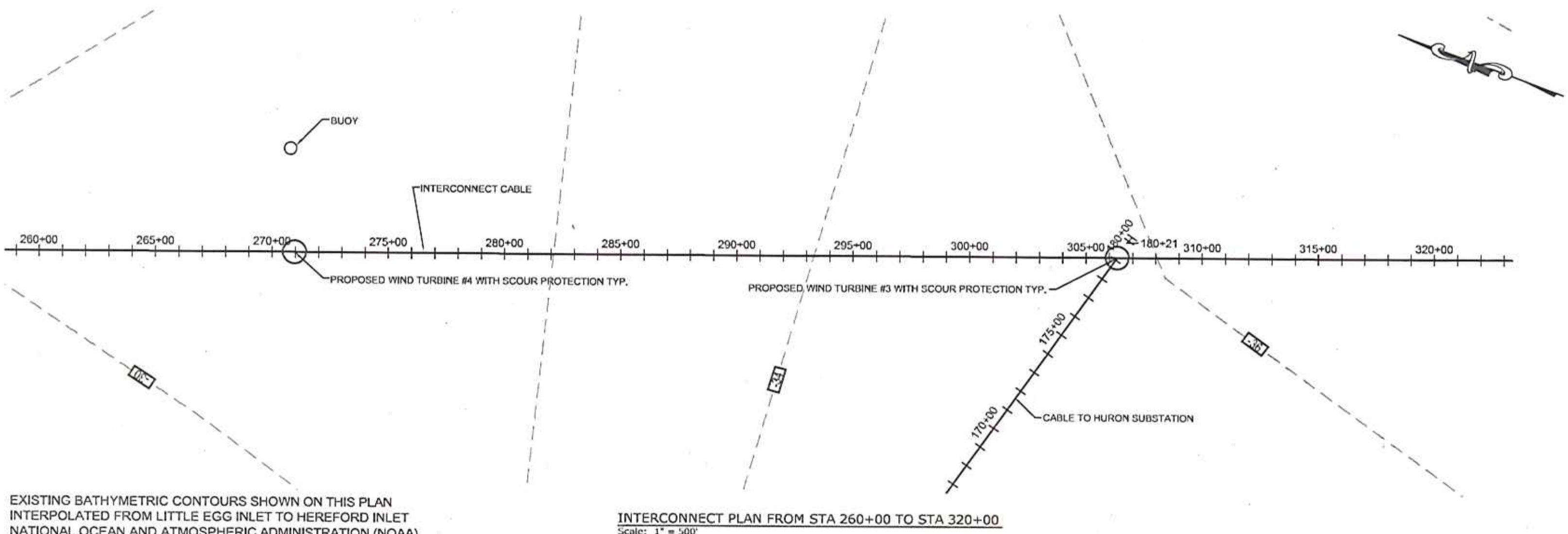
PROJECT NUMBER:
775230003

DRAWING NUMBER:
C-5

SHEET NUMBER:
6 OF 9

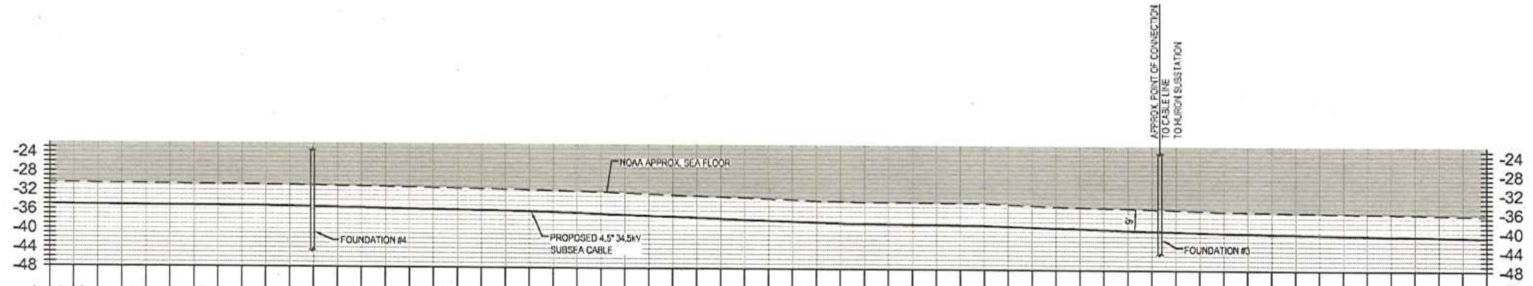
E-6

T:\Fisherman's Energy\07052011\Drawings from Revision 3\Fishermen's Energy Plan & Profile Rev 3.dwg • C-5 • Jul. 07, 2011 4:33pm • david.blanchard



EXISTING BATHYMETRIC CONTOURS SHOWN ON THIS PLAN
INTERPOLATED FROM LITTLE EGG INLET TO HEREFORD INLET
NATIONAL OCEAN AND ATMOSPHERIC ADMINISTRATION (NOAA)
NATIONAL OCEAN SERVICE COAST SURVEY CHART NUMBER 12318.

INTERCONNECT PLAN FROM STA 260+00 TO STA 320+00
Scale: 1" = 500'



260+00	-30.53
261+00	-30.59
262+00	-30.63
263+00	-30.66
264+00	-30.69
265+00	-30.72
266+00	-30.74
267+00	-30.77
268+00	-30.81
269+00	-30.85
270+00	-30.89
271+00	-30.96
272+00	-31.04
273+00	-31.13
274+00	-31.21
275+00	-31.29
276+00	-31.38
277+00	-31.46
278+00	-31.55
279+00	-31.63
280+00	-31.71
281+00	-31.84
282+00	-31.97
283+00	-32.14
284+00	-32.32
285+00	-32.51
286+00	-32.69
287+00	-32.87
288+00	-33.05
289+00	-33.22
290+00	-33.40
291+00	-33.57
292+00	-33.75
293+00	-33.92
294+00	-34.08
295+00	-34.22
296+00	-34.36
297+00	-34.49
298+00	-34.63
299+00	-34.77
300+00	-34.91
301+00	-35.04
302+00	-35.18
303+00	-35.32
304+00	-35.45
305+00	-35.58
306+00	-35.72
307+00	-35.85
308+00	-35.98
309+00	-36.06
310+00	-36.16
311+00	-36.25
312+00	-36.34
313+00	-36.41
314+00	-36.48
315+00	-36.55
316+00	-36.62
317+00	-36.68
318+00	-36.75
319+00	-36.81
320+00	-36.87

INTERCONNECT PROFILE FROM STA 260+00 TO STA 320+00
Horiz. Scale: 1" = 500'
Vert. Scale: 1" = 10'

NOT FOR CONSTRUCTION

NO.	ISSUE / REVISION DESCRIPTION	BY	DATE
4	REVISED FOUNDATION	RM	07-07-11
3	REROUTED SUPPLY CABLE TO TURBINE #3	RM	04-19-11
2	REROUTED SUPPLY CABLE TO TURBINE #3	RM	10-22-10
1	PER ARMY CORP COMMENTS	MM	08-09-10

PROJECT:
NJDEP LAND USE PERMIT
20MW OFF SHORE WIND PROJECT
ATLANTIC CITY, NEW JERSEY

TITLE:
INTERCONNECT CABLE PLAN
AND PROFILE STA. 260+00 TO 320+00

SEAL:

ROBERT K. MONAHAN
N.J. PROFESSIONAL ENGINEER
ENGINEER NO. GE44911

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FAX: (610) 828-8700
WEB: WWW.AMEC.COM

NEW JERSEY CER. OF
AUTH. NO. 24GA28010900

DESIGNED BY: DA	DRAWN BY: RJB
CHECKED BY: RM	DATE: 19 APRIL 2011
SCALE: AS SHOWN	REVISION: 3

PROJECT NUMBER:
775230003

DRAWING NUMBER:
C-6

SHEET NUMBER:
7 OF 9

E-7

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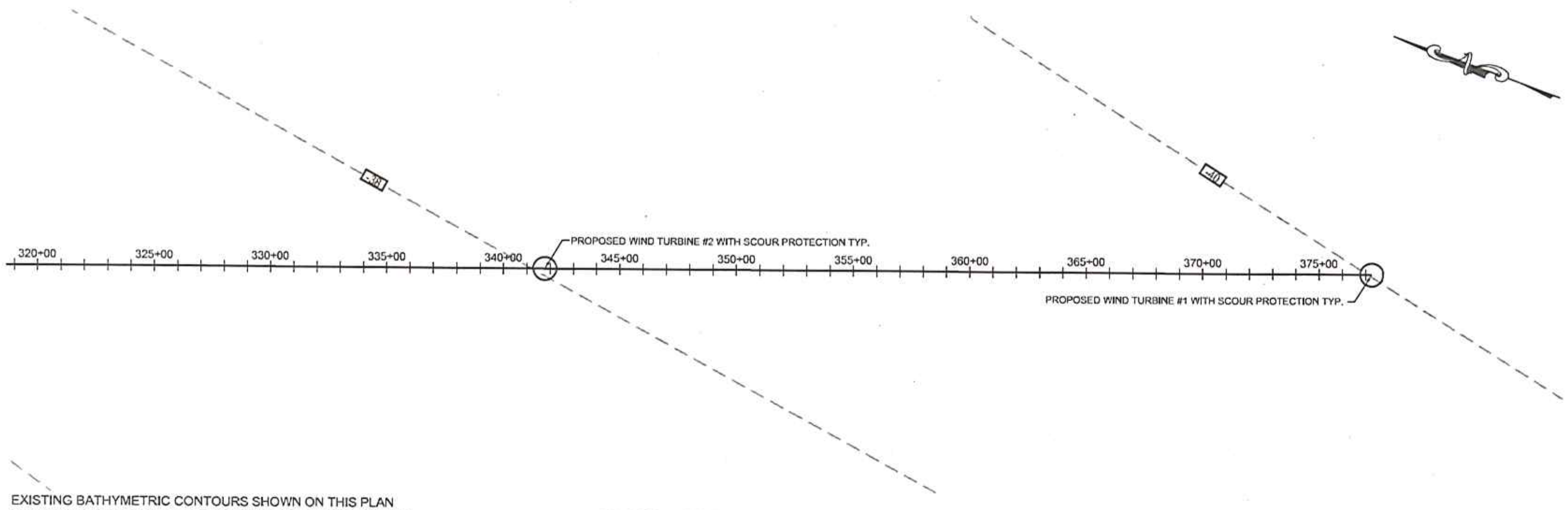
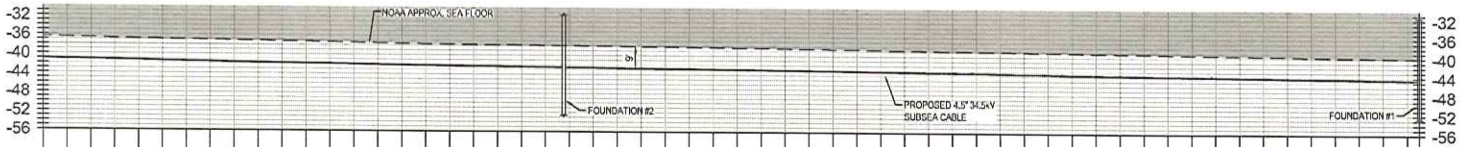


EXISTING BATHYMETRIC CONTOURS SHOWN ON THIS PLAN
INTERPOLATED FROM LITTLE EGG INLET TO HEREFORD INLET
NATIONAL OCEAN AND ATMOSPHERIC ADMINISTRATION (NOAA)
NATIONAL OCEAN SERVICE COAST SURVEY CHART NUMBER 12318.

INTERCONNECT CABLE PLAN FROM STA 320+00 TO STA 377+50
Scale: 1"=500'



320+00	-36.87
321+00	-36.94
322+00	-37.00
323+00	-37.06
324+00	-37.12
325+00	-37.18
326+00	-37.24
327+00	-37.30
328+00	-37.35
329+00	-37.41
330+00	-37.47
331+00	-37.52
332+00	-37.58
333+00	-37.63
334+00	-37.68
335+00	-37.74
336+00	-37.79
337+00	-37.84
338+00	-37.89
339+00	-37.94
340+00	-38.00
341+00	-38.02
342+00	-38.05
343+00	-38.07
344+00	-38.09
345+00	-38.14
346+00	-38.25
347+00	-38.34
348+00	-38.40
349+00	-38.45
350+00	-38.50
351+00	-38.55
352+00	-38.61
353+00	-38.66
354+00	-38.71
355+00	-38.76
356+00	-38.81
357+00	-38.86
358+00	-38.92
359+00	-38.97
360+00	-39.03
361+00	-39.08
362+00	-39.14
363+00	-39.19
364+00	-39.25
365+00	-39.30
366+00	-39.36
367+00	-39.41
368+00	-39.47
369+00	-39.53
370+00	-39.59
371+00	-39.64
372+00	-39.70
373+00	-39.76
374+00	-39.82
375+00	-39.88
376+00	-39.94
377+00 377+50	-40.00

INTERCONNECT CABLE PROFILE FROM STA 320+00 STA 377+50
1"=200' HOR
1"=10' VER

NOT FOR CONSTRUCTION

PROJECT:
NJDEP LAND USE PERMIT
20MW OFF SHORE WIND PROJECT
ATLANTIC CITY, NEW JERSEY

TITLE:
INTERCONNECT CABLE PLAN
AND PROFILE STA.320+00 TO 377+50

NO.	ISSUE / REVISION DESCRIPTION	BY	DATE
4	REVISED FOUNDATION	RM	07-07-11
3	REROUTED SUPPLY CABLE TO TURBINE #3	RM	04-19-11
2	REROUTED SUPPLY CABLE TO TURBINE #3	RM	10-22-10
1	PER ARMY CORP COMMENTS	MM	08-09-10

SEAL:

ROBERT K. MONAHAN
N.J. PROFESSIONAL ENGINEER
ENGINEER NO. GE44911

E-8

amec
EARTH & ENVIRONMENTAL, INC.
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FAX: (610) 828-8700
WEB: WWW.AMEC.COM

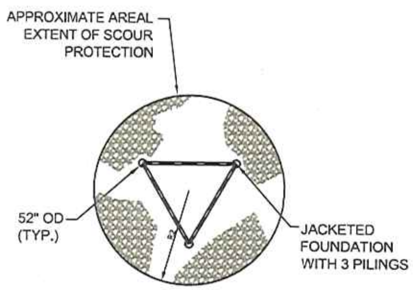
NEW JERSEY CER. OF
AUTH. NO. 24GA28010900

DESIGNED BY: DA	DRAWN BY: RJB
CHECKED BY: RM	DATE: 19 APRIL 2011
SCALE: AS SHOWN	REVISION: 3

PROJECT NUMBER:
775230003

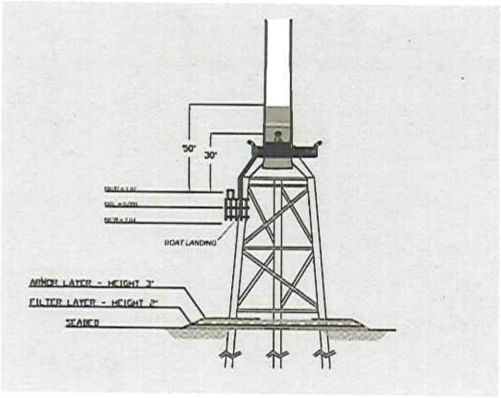
DRAWING NUMBER:
C-7

SHEET NUMBER:
8 OF 9



PLAN VIEW

NOTE: STATIC ROCK SCOUR PROTECTION DEPICTED. OTHER SYSTEMS MAY BE USED AND ARE EXPECTED TO REMAIN WITHIN FOOTPRINT.



ELEVATION

NOTES:

1. CABLE INSTALLED USING HORIZONTAL DIRECTIONAL DRILLING (HDD) TECHNIQUES BETWEEN ON-SHORE JUNCTION BOX (STA. 0+00) AND THE OFFSHORE TRANSITION POINT (STA. 25+30).
2. DISTURBANCE AS A RESULT OF HDD WOULD BE LIMITED TO THE ENTRY AND EXIT POINTS OF THE DRILL. OFF-SHORE DISTURBANCE WOULD BE LIMITED TO THE TRANSITION POINT.
3. CABLE INSTALLED USING JET PLOWING TECHNIQUES BEYOND OFF-SHORE TRANSITION POINT (STA. 25+30) TO AND BETWEEN MONOPOLE FOUNDATIONS.
4. JET PLOW TECHNOLOGY HAS BEEN SHOWN TO MINIMIZE IMPACT TO MARINE HABITAT BY CUTTING AND FLUIDIZING THE SEDIMENTS WHILE THE PIPE IS LAID IN THE TRENCH. SEDIMENTS QUICKLY RESETTLE OVER THE TOP OF THE CABLE MINIMIZING DISPERSION OF BOTTOM SEDIMENTS.
5. ESTIMATED AREA OF DISTURBANCE AT EACH FOUNDATION = 31,420 SQ. FT.
6. ESTIMATED VOLUME OF FILTER ROCK AT EACH FOUNDATION = 2200 CY.
   ESTIMATED VOLUME OF ARMOR ROCK AT EACH FOUNDATION = 2800 CY.

FOUNDATION SCOUR PROTECTION (TYP.)
NOT TO SCALE

1
C-8

NOT FOR CONSTRUCTION

NO.	ISSUE / REVISION DESCRIPTION	BY	DATE
4	REVISED FOUNDATION	RM	07-07-11
3	REROUTED SUPPLY CABLE TO TURBINE #3	RM	04-19-11
2	REROUTED SUPPLY CABLE TO TURBINE #3	RM	10-22-10
1	PER ARMY CORP COMMENTS	MM	08-09-10

PROJECT:
NJDEP LAND USE PERMIT
20MW OFF SHORE WIND PROJECT
ATLANTIC CITY, NEW JERSEY

TITLE:
DETAILS

SEAL:

ROBERT K. MONAHAN
N.J. PROFESSIONAL ENGINEER
ENGINEER NO. GE44911

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EARTH & ENVIRONMENTAL, INC.
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FAX: (610) 828-6700
WEB: WWW.AMEC.COM

NEW JERSEY CER. OF
AUTH. NO. 24GA28010900

DESIGNED BY: DA	DRAWN BY: RJB
CHECKED BY: RM	DATE: 19 APRIL 2011
SCALE: AS SHOWN	REVISION: 3

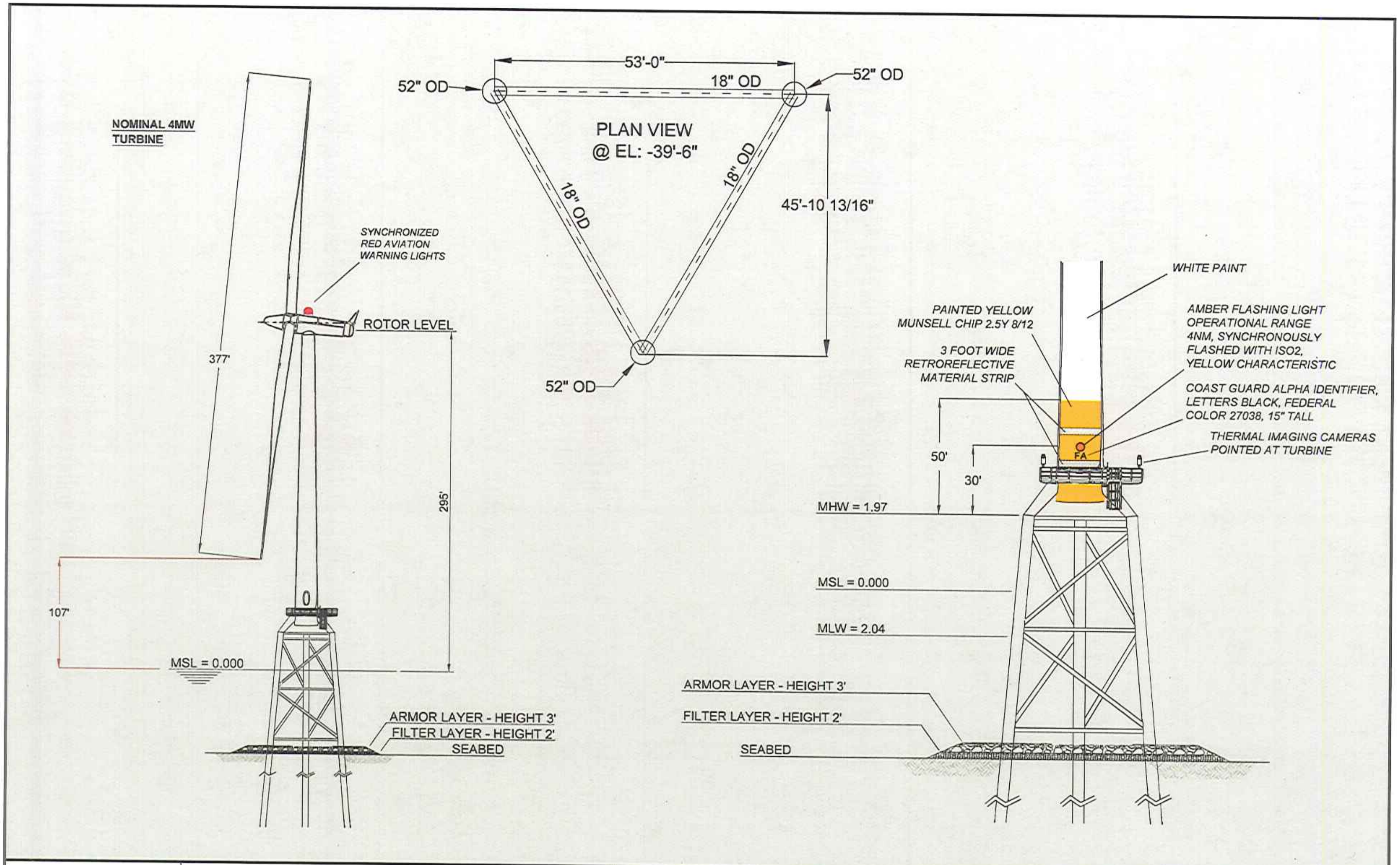
PROJECT NUMBER:
775230003

DRAWING NUMBER:
C-8

SHEET NUMBER:
9 OF 9

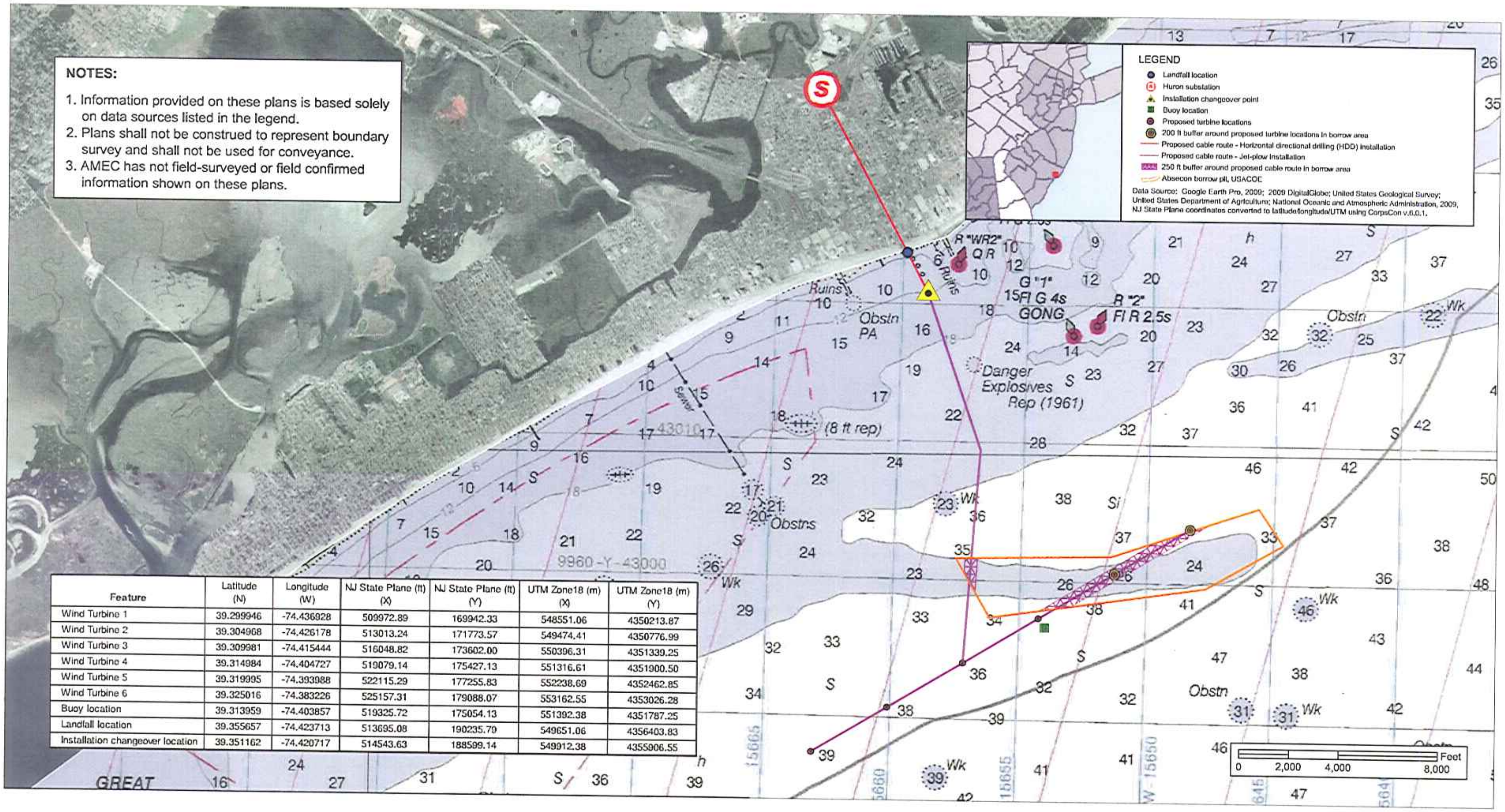
E-9

T:\Fishermen's Energy\07052011\Drawings from Revision 3\Fishermen's Energy Plan & Profile Rev 3.dwg • DETAILS • Jul 07, 2011 4:15pm • david.blanchard



E-10

CLIENT FISHERMEN'S ENERGY	DWN BY: PJK CHK'D BY: CH	PROJECT **20MW OFF SHORE WIND PROJECT** ATLANTIC CITY, NEW JERSEY	REV. NO.: 0 DATE: JANUARY 11, 2012
AMEC Earth & Environmental 285 DAVIDSON AVENUE, SUITE 405 SOMERSET, NEW JERSEY 08873	amec	DATUM: 775230003 APPROXIMATE SCALE: N.T.S.	TITLE WIND TURBINE DETAIL	PROJECT NO: - FIGURE No. 1



NOTES:

1. Information provided on these plans is based solely on data sources listed in the legend.
2. Plans shall not be construed to represent boundary survey and shall not be used for conveyance.
3. AMEC has not field-surveyed or field confirmed information shown on these plans.

LEGEND

- ● Landfall location
- Ⓢ Huron substation
- ▲ Installation changeover point
- ■ Buoy location
- ● Proposed turbine locations
- ◉ 200 ft buffer around proposed turbine locations in borrow area
- — Proposed cable route - Horizontal directional drilling (HDD) installation
- — Proposed cable route - Jet-plow installation
- ▨ 250 ft buffer around proposed cable route in borrow area
- ⌒ Absecon borrow pit, USACOE

Data Source: Google Earth Pro, 2009; 2009 DigitalGlobe; United States Geological Survey; United States Department of Agriculture; National Oceanic and Atmospheric Administration, 2009, NJ State Plane coordinates converted to latitude/longitude/UTM using CorpsCon v.6.0.1.

Feature	Latitude (N)	Longitude (W)	NJ State Plane (ft) (X)	NJ State Plane (ft) (Y)	UTM Zone18 (m) (X)	UTM Zone18 (m) (Y)
Wind Turbine 1	39.299946	-74.436928	509972.89	169942.33	548551.06	4350213.87
Wind Turbine 2	39.304968	-74.426178	513013.24	171773.57	549474.41	4350776.99
Wind Turbine 3	39.309981	-74.415444	516048.82	173602.00	550396.31	4351339.25
Wind Turbine 4	39.314984	-74.404727	519079.14	175427.13	551316.61	4351900.50
Wind Turbine 5	39.319995	-74.393988	522115.29	177255.83	552238.69	4352462.85
Wind Turbine 6	39.325016	-74.383226	525157.31	179088.07	553162.55	4353026.28
Buoy location	39.313959	-74.403857	519325.72	175054.13	551392.38	4351787.25
Landfall location	39.355657	-74.423713	513695.08	190235.79	549651.06	4356403.83
Installation changeover location	39.351162	-74.420717	514543.63	188599.14	549912.38	4355906.55

E-11

NOT FOR CONSTRUCTION

REVISIONS

NO.	DESCRIPTION	BY	DATE

ROBERT K. MONAHAN
NJ PROFESSIONAL
ENGINEER NO. GE44911

CLIENT:
FISHERMEN'S ENERGY OF NEW JERSEY, LLC
P.O. BOX 555
CAPE MAY, NEW JERSEY 08201

amec Earth & Environmental

ONE PLYMOUTH MEETING, SUITE 850
PLYMOUTH MEETING, PA 19462-1308
NEW JERSEY CERT. OF AUTH. NO. 24GA28010900

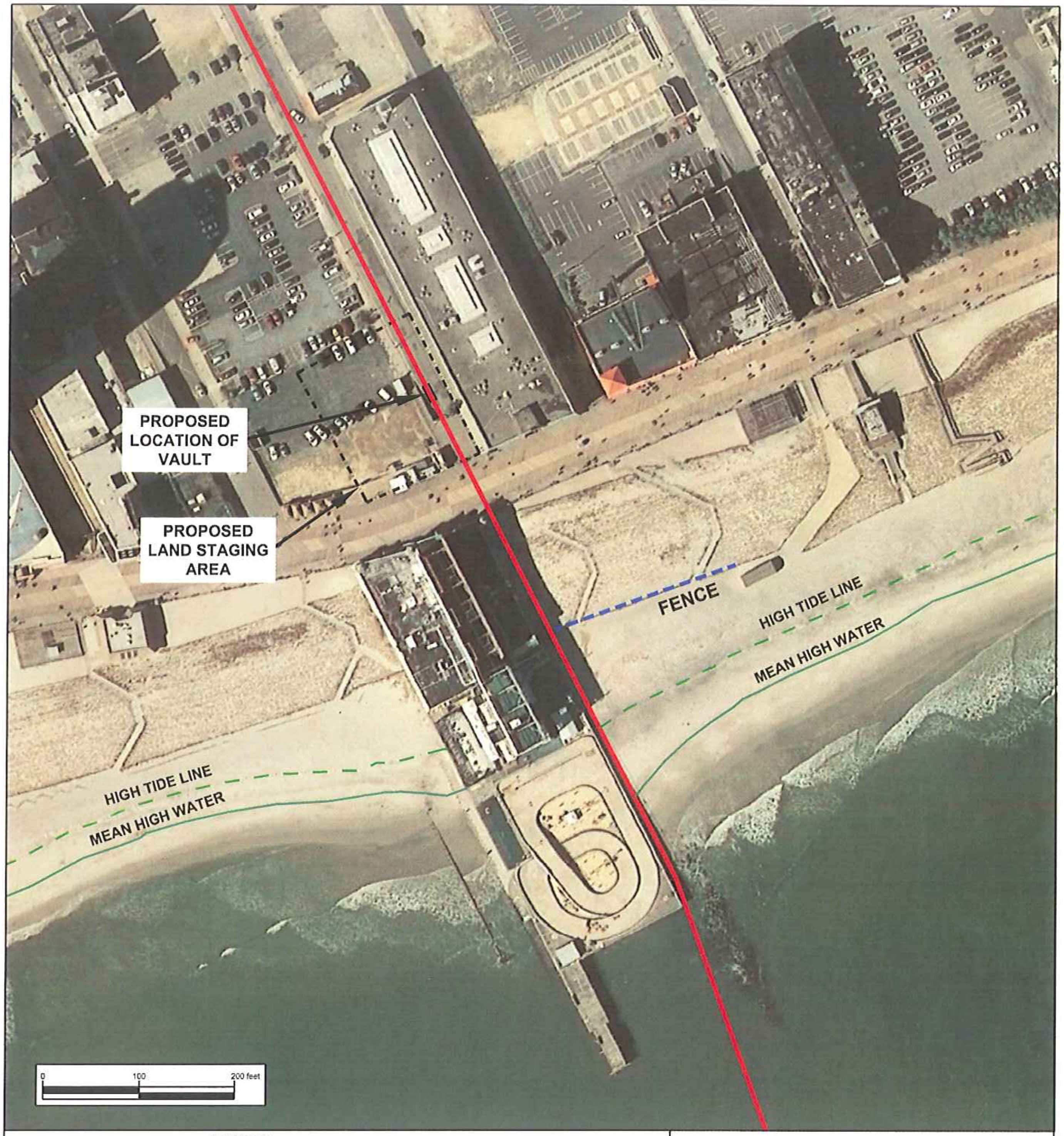
285 DAVIDSON AVENUE, SUITE 450
SOMERSET, NJ 08873-4153

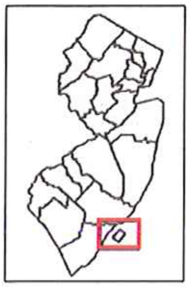
PROJECT
FISHERMEN'S ATLANTIC CITY WINDFARM, LLC
20 MW OFFSHORE WINDFARM

TITLE
FIGURE 1
OVERALL SITE PLAN

DATE: 07/12/2011
PROJECT NO: PROJECT NO.
SCALE: AS SHOWN
SHEET No. 1

C:_Projects\Chuck_fishermens_energy\11_011711_fdelonde\11_012611_fdelonde\fdelonde2014_changed_to_fig1_rev071211.dwg - Layout1 - Jul. 12, 2011 5:07pm - pamela.koneto





NJSPCS NAD83

LEGEND

- — proposed cable route
- - - - fence
- — mean high water
- - - high tide line

Image Source:
NJDEP 2007 Digital Orthoimagery

Data Sources:
Mean High Water (MHW) line reflects the MHW elevation of 1.58 feet (NAVD88) per NOAA Station 8534720.

High Tide Line (HTL) reflects the highest predicted lunar tide limit elevation for 2004, which was established by USACE at 3.12 NAVD88.

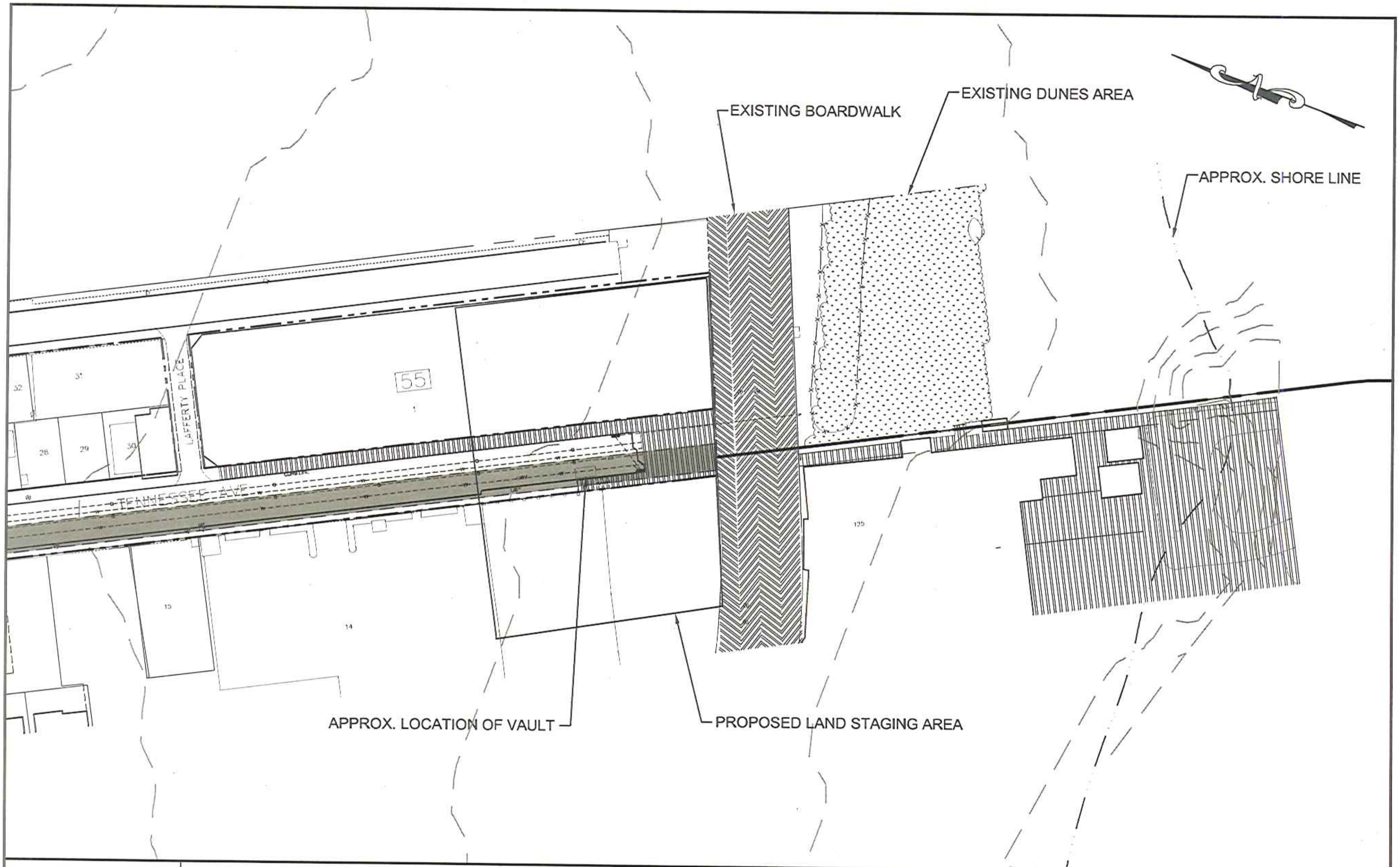
MHW line and HTL were developed using USACE Absecon Island, New Jersey Beach Profile Data, dated December 2003.

FISHERMEN'S ENERGY

amec Earth & Environmental

Proposed 20MW Project Land-Based
Transition Vault
20MW Off Shore Wind Project
Atlantic City, New Jersey

Rev. By: MSL	Project No.: 775230003	08/19/2010



E-13

CLIENT
FISHERMEN'S ENERGY

AMEC Earth & Environmental
502 WEST GERMANTOWN PIKE, SUITE 850
PLYMOUTH MEETING, PENNSYLVANIA 19462

amec

DWN BY: RJB
CHK'D BY: RKM
DATUM: 775230003
APPROXIMATE SCALE: N.T.S.

PROJECT
20MW OFF SHORE WIND PROJECT
ATLANTIC CITY, NEW JERSEY

TITLE
PROPOSED LAND STAGING

REV. NO.: 0
DATE: MAY 5, 2010
PROJECT NO: -
FIGURE No. 5

LEGEND

proposed 34.5kV cable route

🅢 Huron substation

Image Source:
NJDEP 2007 Digital Orthoimagery

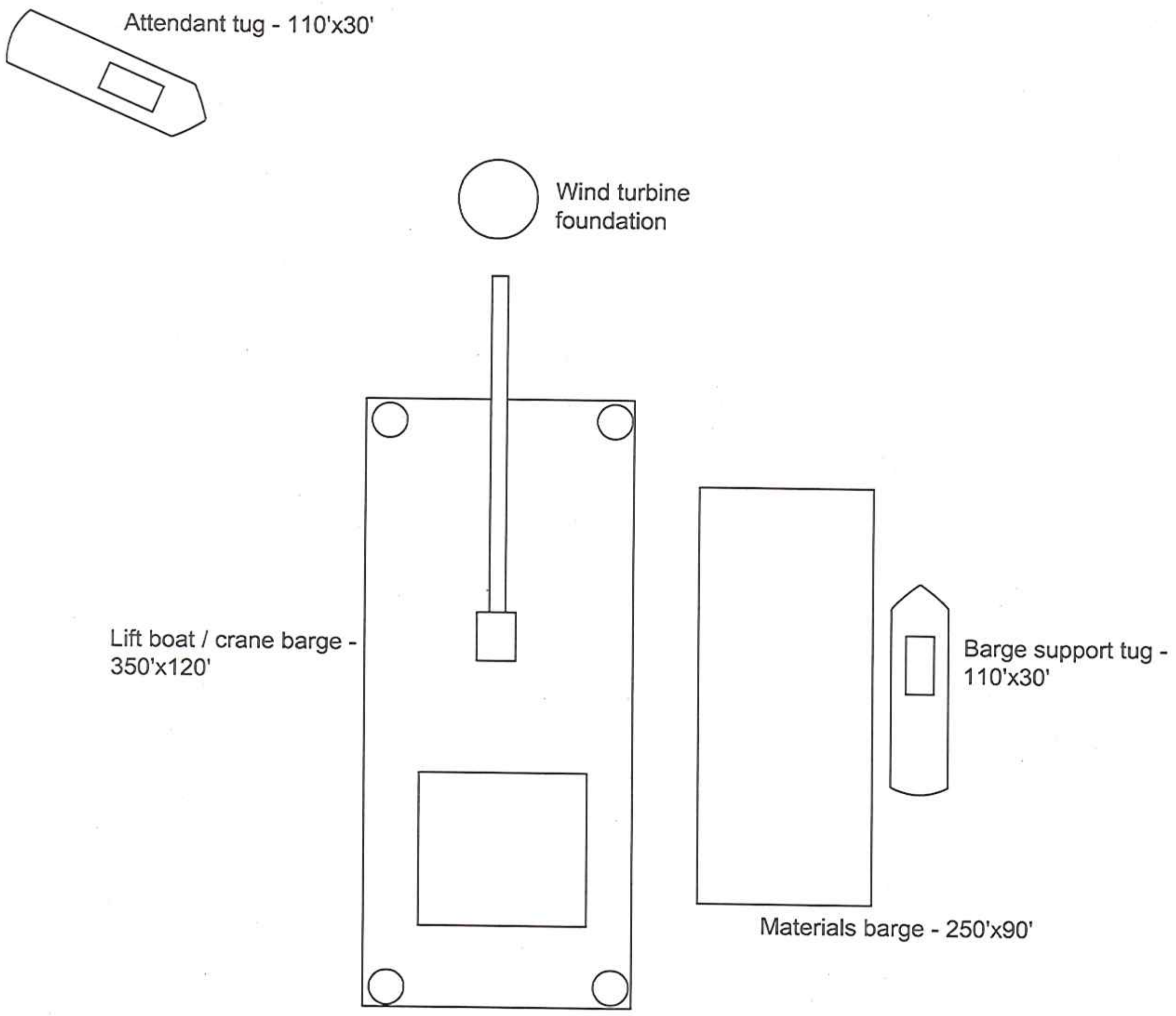
amec Earth & Environmental

Potential 20MW Project Substation
and Control Equipment
20MW Off Shore Wind Project
Atlantic City, New Jersey

Rev. By: CH	Project No.: 775230003	08/02/2010

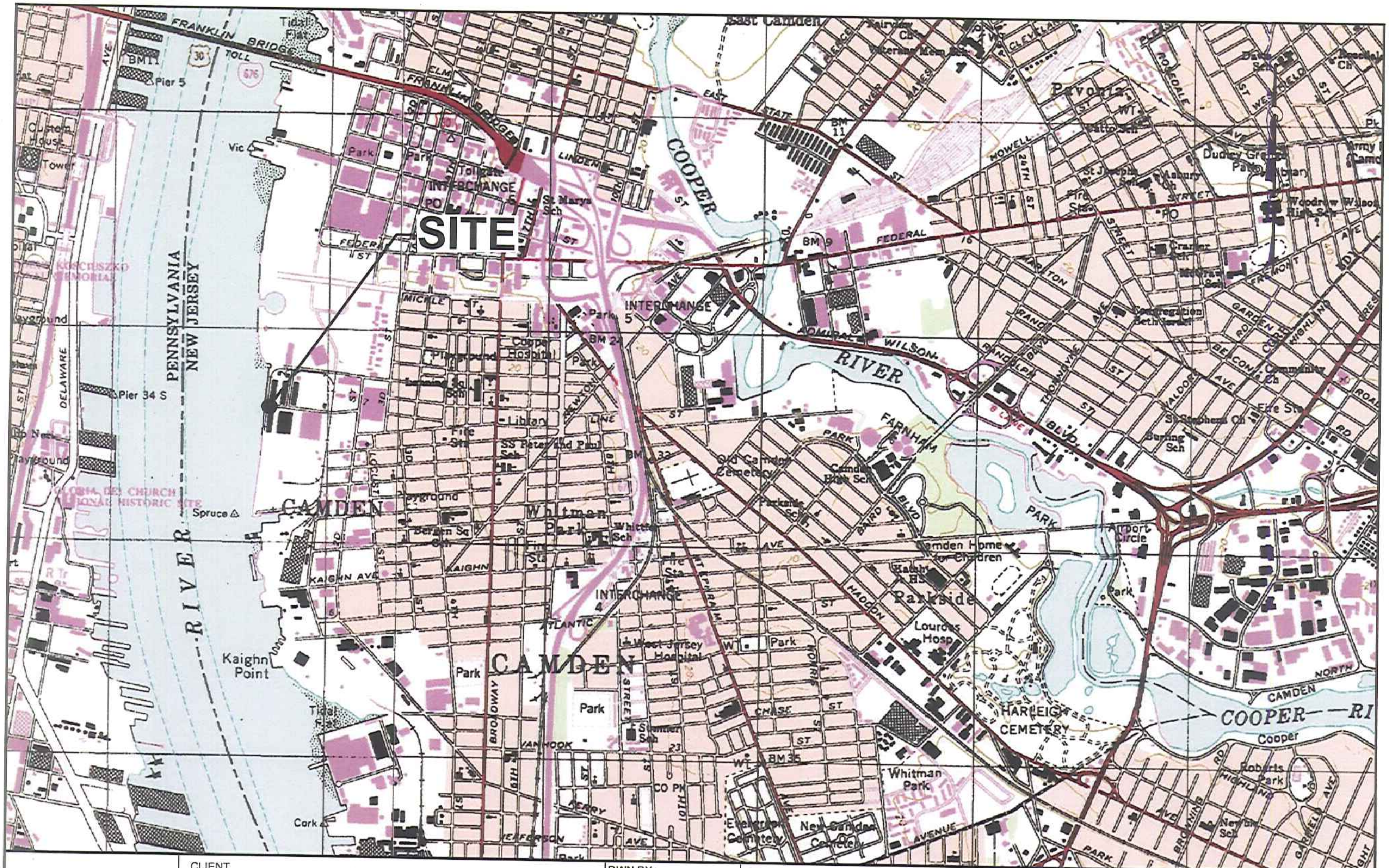
E-14

E-15



Fishermen's Energy - Atlantic City Windfarm

Wind Turbine Installation
Marine Spread Concept



CLIENT

FISHERMEN'S ENERGY

DWN BY: RJB

CHK'D BY: RKM

DATUM: 775230003

APPROXIMATE SCALE: N.T.S.

PROJECT

20MW OFF SHORE WIND PROJECT
ATLANTIC CITY, NEW JERSEY

TITLE

BECKETT STREET
DOCK

REV. NO.: 0

DATE: JUNE 18, 2010

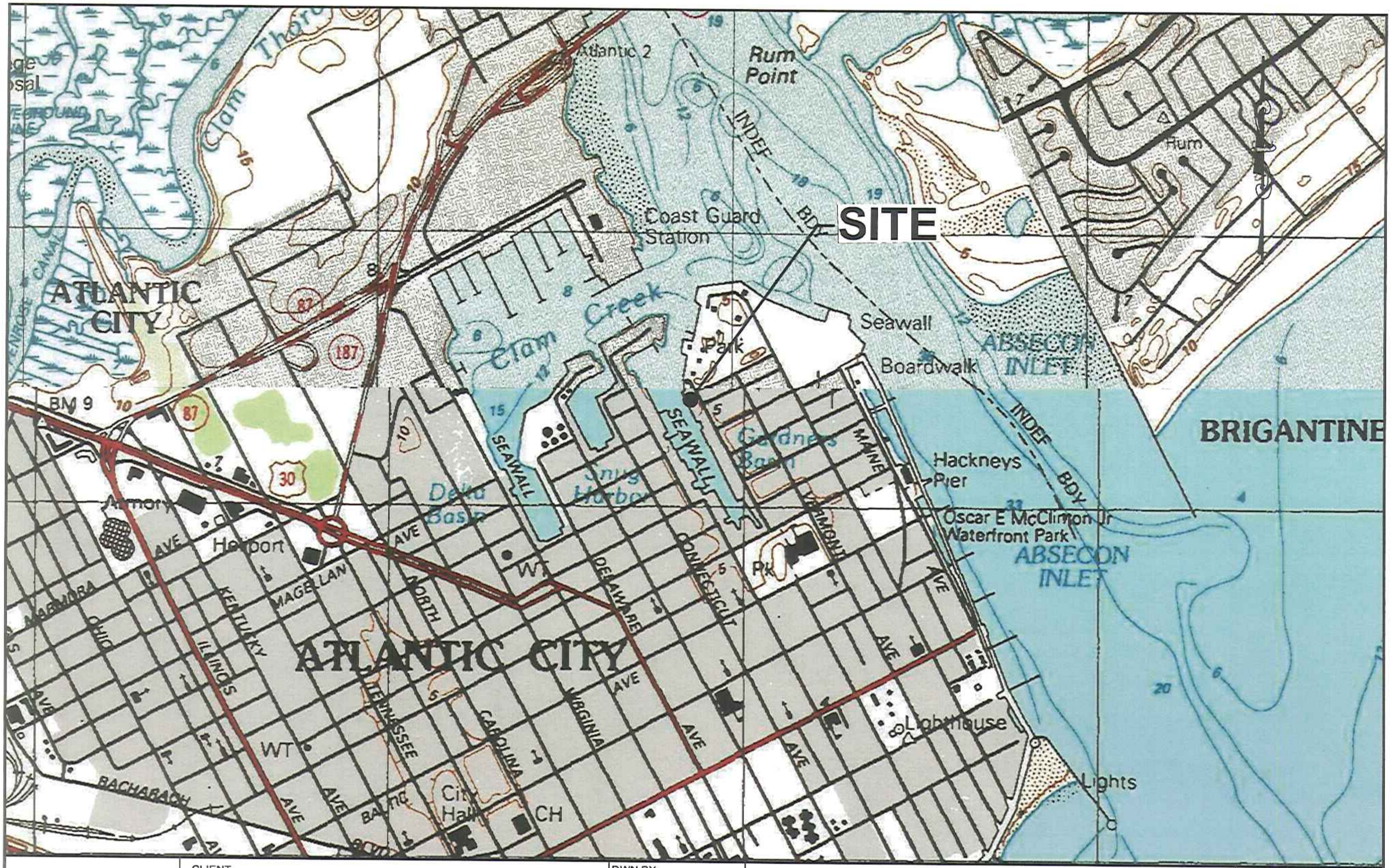
PROJECT NO: -

FIGURE No. 4

AMEC Earth & Environmental
502 WEST GERMANTOWN PIKE, SUITE 850
PLYMOUTH MEETING, PENNSYLVANIA 19462

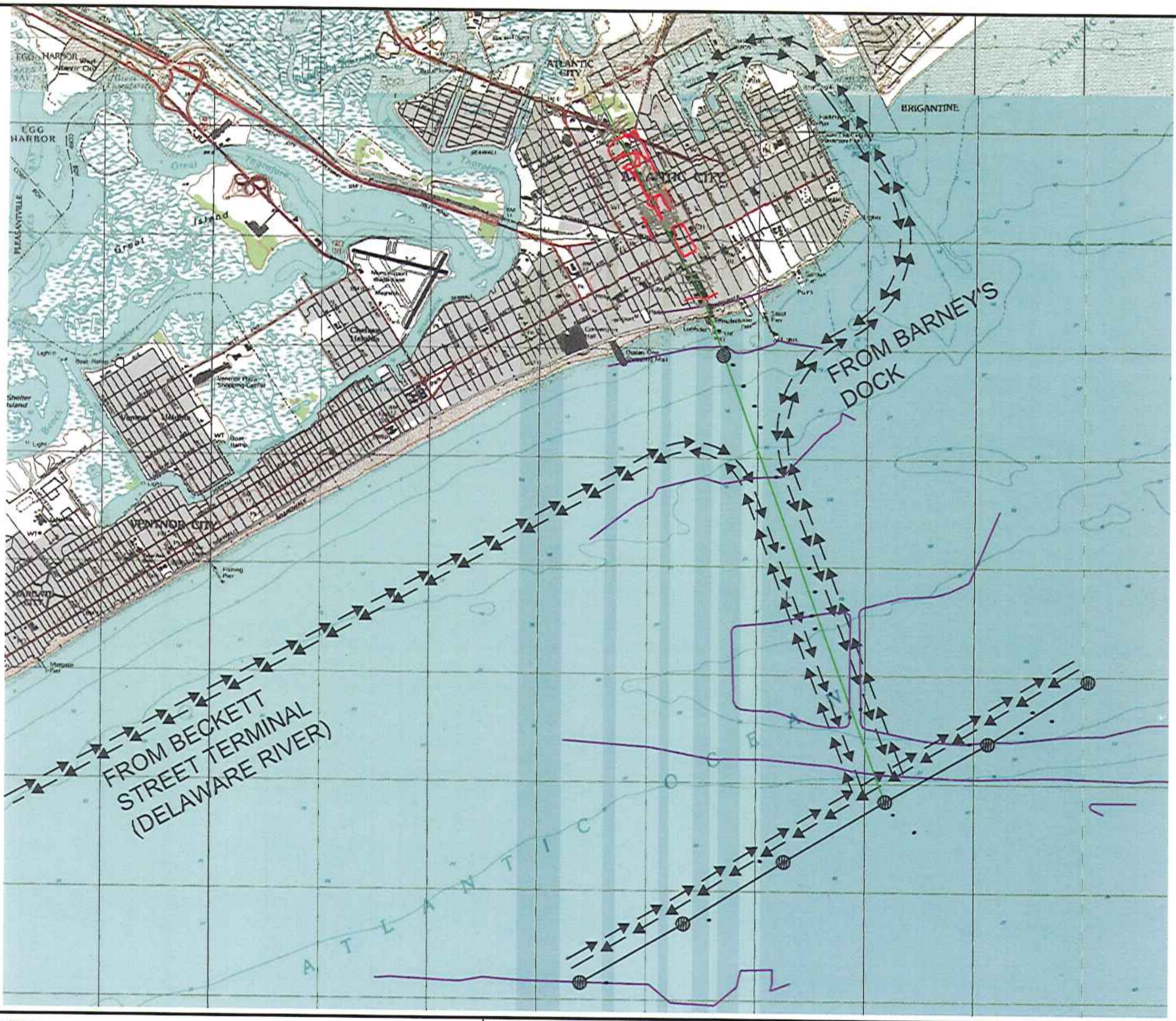
amec

E-16



E-17

	CLIENT	DWN BY:	PROJECT	REV. NO.:
	FISHERMEN'S ENERGY	RJB	**20MW OFF SHORE WIND PROJECT** ATLANTIC CITY, NEW JERSEY	0
		CHK'D BY: RKM		DATE: JUNE 18, 2010
AMEC Earth & Environmental 502 WEST GERMANTOWN PIKE, SUITE 850 PLYMOUTH MEETING, PENNSYLVANIA 19462	amec	DATUM: 775230003	TITLE BARNEY'S DOCK	PROJECT NO: -
		APPROXIMATE SCALE: N.T.S.		FIGURE No. 4



E-18

CLIENT FISHERMEN'S ENERGY	DWN BY: RJB CHK'D BY: RKM	PROJECT **20MW OFF SHORE WIND PROJECT** ATLANTIC CITY, NEW JERSEY	REV. NO.: 0 DATE: MAY 5, 2010
AMEC Earth & Environmental 502 WEST GERMANTOWN PIKE, SUITE 850 PLYMOUTH MEETING, PENNSYLVANIA 19462	DATUM: 775230003 APPROXIMATE SCALE: N.T.S.	TITLE VESSEL ROUTE	PROJECT NO: - FIGURE No. 2

APPENDIX F

NJDEP PERMIT

March 29, 2011

Modification Approved July 1, 2015

Permit Expiration Date June 30, 2016

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF LAND USE REGULATION
Mail Code 501-02A, P.O. Box 420, Trenton, NJ 08625-0420
TEL: # (609) 777-0454
FAX # (609) 777-3656

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

Fishermen's Atlantic City Windfarm, LLC
c/o Chris Wissemann
1616 Pacific Avenue, Suite 400
Atlantic City, NJ 08401

JUL 01 2015

RE: Application for Modification to Waterfront Development Permit & Water Quality Certificate (File #0102-09-0024.2, WFD100001 & CDT100001)
File No.: 0102-09-0024.2, WFD140001
Applicant: Fishermen's Atlantic City Windfarm, LLC
Block(s): N/A Lot(s): N/A
Project Location: ± 2.8 miles offshore of Atlantic City
Atlantic City, Atlantic County

Dear Mr. Wissemann:

This is with reference to your request for a modification to the above project, which was granted a CAFRA Individual Permit, Waterfront Development Permit and Water Quality Certificate on March 29, 2011 (LUR File #0102-09-0024.2, CAF100001, WFD100001 and CDT100001) to install six (6) marinized wind turbines (4 MW nominal power rating each) and appurtenant submarine cables, located approximately 2.8 nautical miles off-shore of Atlantic City, for creating clean renewable energy.

The subject application proposes to modify specific aspects of the project within the Atlantic Ocean (waterward of the Mean High Water Line), requiring a modification to the Waterfront Development Permit and Water Quality Certificate. No modifications are proposed upland of the Mean High Water Line; therefore, no modification to the CAFRA Individual Permit is necessary.

The currently proposed permit modification involves the following:

1. A clarification that <u>up to</u> six (6) Siemens 4.0-130 turbines (4 MW nominal power rating each), for a maximum output of approximately 24 MW are authorized.
2. Modify the turbine foundation type from the previously authorized monopole to a jack-type foundation. Each turbine foundation is an IBGS which consists of four legs. The foundation will be anchored to the seabed by steel pilings, seven feet (84 inches) in diameter, driven to a depth of approximately 150 feet below the seabed using an impact hammer.
3. Eliminate the previously authorized ± 5,820 cubic yards of rock scour protection at the base of each monopole (total of ± 34,920 cubic yards of scour protection) due to the foundation change.

4. Modify the transition point for HDD to jet-plow cable installation from 2,200 feet to 1,800 feet offshore of the Tennessee Avenue beach.
5. Reduce the subsea cable burial depth to allow for a target burial depth of six (6) feet below the seabed.
6. Modify the size of the subsea cable to allow for the use of a cable with a diameter of 8 inches or less.
7. Clarify that the subsea cable route was previously authorized from turbine #3 to the shore landing at the base of Tennessee Avenue.

The Department has no objection to these proposed changes to the project and therefore approves your request for a modification, provided the below conditions are met. All terms and conditions of the original approval remain in effect and this letter only extends the original permit expiration date pursuant to the Permit Extension Act (N.J.S.A. 40:55D-136.1 et seq. as amended), to June 30, 2016.

Conditions

1. This permit modification is issued subject to compliance with LUR File #0102-09-0024.2, CAF100001, WFD100001 and CDT100001.

2. The permittee shall obtain all other applicable Federal, State and local approvals, including Section 408 authorization from the Department of the Army, Army Corps of Engineers.

Approved Plans

The modified plans hereby approved are as follows:

- Sheet No. 1 of 1 entitled "Overall Site Plan", dated November 27, 2014, last revised December 4, 2014, and prepared by William J. Mikula, PE of AMEC Environment & Infrastructure.
- Eight (8) sheets collectively entitled "Fishermen's Atlantic City Windfarm, LLC, 25 MW Offshore Windfarm, Offshore Atlantic County, New Jersey, AMEC Project No. 775230003, May 5, 2010 (Revision 5 – December 5, 2014)", dated December 2014, last revised December 5, 2014, and prepared by William J. Mikula, PE of AMEC Environment & Infrastructure.

Appeal of Decision

In accordance with N.J.A.C. 7:7-5.1, any person who is aggrieved by this decision may request a hearing within 30 days of the decision date by writing to: New Jersey Department of Environmental Protection, Office of Legal Affairs, Attention: Adjudicatory Hearing Requests, CN 402, Trenton, NJ 08625-0402. This request must include a completed copy of the Administrative Hearing Request Checklist.

If you have any questions regarding this authorization, please contact Janet Stewart of our staff at (609) 984-6216 or by email at janet.stewart@dep.nj.gov. Please reference the above file number.

Sincerely,

Christopher Jones, Manager
Bureau of Urban Growth & Redevelopment

c: Agent (original approval sent to agent to facilitate condition compliance)
NJDEP Bureau of Coastal and Land Use Enforcement, Toms River office, attn: Harry Nicol
US Army Corps of Engineers, Philadelphia District, attn: Lawrence Slavitter
City of Atlantic City Clerk
City of Atlantic City Construction Official

mailed 3/3

STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF LAND USE REGULATION
P.O. Box 439, Trenton, New Jersey 08625-0439
Fax: (609) 777-3656 or (609) 292-8115
www.state.nj.us/dep/landuse

PERMIT

In accordance with the laws and regulations of the State of New Jersey, the Department of Environmental Protection hereby grants this permit to perform the activities described below. This permit is revocable with due cause and is subject to the limitations, terms and conditions listed below and on the attached pages. For the purpose of this document, "permit" means "approval, certification, registration, authorization, waiver, etc." Violation of any term, condition or limitation of this permit is a violation of the implementing rules and may subject the permittee to enforcement action.	Approval Date MAR 29 2011 Expiration Date MAR 29 2016

Permit Number(s) 0102-09-0024.2, CAF100001, WFD100001 & CDT100001	Type of Approval(s) CAFRA Individual Permit; Waterfront Development Permit; Water Quality Certificate	Enabling Statute(s) N.J.S.A. 13:19-1 N.J.S.A. 12:5-1 N.J.S.A. 58:10-1

Applicant Fishermen's Atlantic City Windfarm, LLC P.O. Box 555 Cape May, NJ 08204	Site Location Block(s) and Lot(s): N/A; N/A Municipality: City of Atlantic City County: Atlantic

Description of Authorized Activities and Limit of Disturbance

Install six (6) marinized wind turbines (4 MW nominal power rating each) and appurtenant submarine cables, located approximately 2.8 nautical miles off-shore of Atlantic City, for creating clean renewable energy. The six turbines are supported by monopole foundations with scour mats and/or ± 5,820 cubic yards of rock scour protection (total of ± 34,920 cubic yards of scour protection). Submarine cables from each turbine will be linked to a main submarine transmission cable system installed via jet-plow and/or manual jetting installation methods to a point ±2,200 feet offshore of the Tennessee Avenue beach, where it transitions via casing pipe installed by horizontal directional drill methods onshore, under the municipal beach area and Boardwalk to an onshore vault on the street side of the Boardwalk, then continuing below ground via duct system and ± two (2) additional underground vault structures, installed via horizontal directional drill and/or conventional excavation methods, within the Tennessee Avenue right-of-way to an above ground step-up transformer constructed adjacent to an existing electrical substation (Huron Substation) and the Marina Thermal Energy facility located along Absecon Boulevard.

This permit is authorized under, and in compliance with the Rules on Coastal Zone Management, N.J.A.C. 7:7E-1.1 et seq. and is compliant with N.J.S.A. 13:19-10 (Section 10 of the New Jersey Coastal Area Facility Review Act), as referenced within the Summary Report prepared by Division staff on March 23, 2011.

The proposed project is shown on the following plans:

1. Nine (9) sheets collectively entitled "Fishermen's Energy Project, Atlantic City, Atlantic County, New Jersey", dated May 5, 2010, unrevised, and prepared by AMEC Earth & Environmental, Inc.
2. Ten (10) sheets collectively entitled "Fishermen's Energy Project, Tennessee Avenue – Underground Cable Routing", dated July 28, 2008, unrevised, and prepared by Arthur W. Ponzio Co. & Associates, Inc.

THIS PERMIT IS NOT EFFECTIVE AND NO CONSTRUCTION APPROVED BY THIS PERMIT, OR OTHER REGULATED ACTIVITY, MAY BE UNDERTAKEN UNTIL THE APPLICANT HAS SATISFIED ALL PRE-CONSTRUCTION CONDITIONS AS SET FORTH IN THIS PERMIT.

Received or Recorded by County Clerk

This permit is not valid unless authorizing signature appears on the last page.

STANDARD CONDITIONS:

1. **Extent of approval:**
   - **a.** This document grants permission to perform certain activities that are regulated by the State of New Jersey. The approved work is described by the text of this permit and is further detailed by the approved drawings listed herein. All work must conform to the requirements, conditions and limitations of this permit and all approved drawings.

   - **b.** If you alter the project without prior approval, or expand work beyond the description of this permit, you may be in violation of State law and may be subject to fines and penalties. Approved work may be altered only with the prior written approval of the Department.

   - **c.** You must keep a copy of this permit and all approved drawings readily available for inspection at the work site.

2. **Acceptance of permit:** If you begin any activity approved by this permit, you thereby accept this document in its entirety, and the responsibility to comply with the terms and conditions. If you do not accept or agree with this document in its entirety, **do not begin** construction. You are entitled to request an appeal within a limited time as detailed on the attached *Administrative Hearing Request Checklist and Tracking Form.*

3. **Recording with County Clerk:** You must record this permit in the Office of the County Clerk for each county involved in this project. You must also mail or fax a copy of the front page of this permit to the Department showing the received stamp from each County Clerk within 30 days of the issuance date.

4. **Notice of Construction:** You must notify the Department in writing at least 7 days before you begin any work approved by this permit.

5. **Expiration date:** All activities authorized by this permit must be completed by the expiration date shown on the first page unless otherwise extended by the Division. At that time, this permit will automatically become invalid and none of the approved work may begin or continue until a replacement permit is granted. (Some permits may qualify for an extension of the expiration date. Please contact the Department for further information.)

6. **Rights of the State:**
   - **a.** This permit is revocable and subject to modification by the State with due cause.

   - **b.** Representatives from the State have the statutory authority to enter and inspect this site to confirm compliance with this permit and may suspend construction or initiate enforcement action if work does not comply with this permit.

   - **c.** This permit does not grant property rights. The issuance of this permit shall not affect any action by the State on future applications, nor affect the title or ownership of property, nor make the State a party in any suit or question of ownership.

7. **Other responsibilities:** You must obtain all necessary local, Federal and other State approvals before you begin work. All work must be stabilized in accordance with the *Standards for Soil Erosion and Sediment Control in New Jersey,* and all fill material must be free of toxic pollutants in toxic amounts as defined in section 307 of the Federal Act.

SPECIAL CONDITIONS IN ADDITION TO THE STANDARD CONDITIONS:

8. The permittee must obtain approval from the Department of the Army prior to commencement of any work within Federal jurisdiction.

9. This permit is issued subject to the approval of Tidelands License #0102-09-0024.2, TDI100001 and TDI100002.

10. No construction may commence on lands encumbered with Green Acres restrictions until such time as the permittee provides verification to this Division that the City of Atlantic City has obtained approval from the State House Commission for a diversion or disposal of parkland pursuant to N.J.A.C. 7:36.

11. In the event that any and/or all of the turbines have completed their useful life, as determined by their owner, Fishermen's Energy Windfarm, LLC shall decommission said turbine(s) in accordance with applicable Federal and State requirements. All physical components of the project shall be removed consistent with the decommissioning plan included in the application, which specifies leaving deeply buried materials in place (i.e. cutting monopoles just below the mudline, leaving submerged cables in place), leaving scour material in place, and the site otherwise restored to its pre-construction condition. Except for emergency conditions, any changes in the decommissioning plan are to be submitted six months in advance of decommissioning to the Department for approval.

12. Prior to any in-water construction, the permittee shall notify, under appropriate protocol, all applicable agencies and mariners that a construction vessel will be moored or traveling within navigable channels. All appropriate safety protocols shall be employed to avoid collisions.

13. The permittee shall follow any temporary navigation restrictions that may be imposed by the US Coast Guard during construction activities.

14. The permittee shall notify appropriate authorities of the need to include the wind turbines on navigation charts and chart updates.

15. The permittee shall obtain the appropriate approval from the Federal Aviation Authority (FAA). A copy of the FAA approval shall be submitted to the Division of Land Use Regulation <u>prior to construction of the turbines</u>.

16. Prior to commencement of any in-water work, the permittee shall conduct a Phase I underwater archaeological survey in order to determine the presence or absence of archaeological deposits and shipwrecks within the project's area of potential effects. This survey shall be submitted to this Division for review and approval. The existence of obstructions within the work area may require alteration of the approved cable and foundation locations, and any modifications to the routes and/or layouts require as-built documentation of final positions for record purposes, prior to final commissioning of the structures. Area(s) of cable and/or foundation re-routing beyond the limits of the Phase 1 archaeological survey shall be subjected to additional Phase 1 survey and Division review and approval prior to construction.

17. Prior to commencement of any in-water work, the permittee shall conduct a geomorphological survey in conjunction with the proposed geotechnical/geophysical

survey in order to determine the presence of submerged and intact paleosols indicative of former human occupation along the cable route. This survey shall be submitted to this Division for review and approval. The existence of findings within the work area may require alteration of the approved cable and foundation locations, and any modifications to the routes and/or layouts require as-built documentation of final positions for record purposes, prior to final commissioning of the structures. Area(s) of cable and/or foundation re-routing beyond the limits of the Phase 1 archaeological survey shall be subjected to additional Phase 1 survey and Division review and approval prior to construction.

18. Prior to commencement of any horizontal directional drilling (HDD) located upland of the MHWL, the permittee shall conduct a Phase I archaeological survey for the HDD entry/exit pits. This survey shall be submitted to this Division for review and approval. The existence of obstructions within the work area may require alteration of the approved cable and foundation locations, and any modifications to the routes and/or layouts require as-built documentation of final positions for record purposes, prior to final commissioning of the structures. Area(s) of cable and/or foundation re-routing beyond the limits of the Phase 1 archaeological survey shall be subjected to additional Phase 1 survey and Division review and approval prior to construction.

19. The permittee shall ensure that the individual(s) conducting the cultural resources investigation work will meet the Secretary of the Interior's Professional Qualifications Standards for archaeology and historic architecture (48 FR 44738-9) during the period of such subsurface investigations.

20. The permittee shall ensure that all phases of the archaeological survey and reporting shall be in keeping with the Secretary of the Interior's *Standards and Guidelines for Archaeology and Historic Preservation* and the archaeological survey and report rules at N.J.A.C. 7:4-8.4 through 8.5. Underwater archaeological survey shall be in keeping with the Bureau of Ocean Energy Management's (BOEM) Phase I underwater archaeological survey guidelines (http://www.gomr.boemre.gov/homepg/regulate/regs/ntls/2005%20NTLs/NTL2005-G07.pdf). Evaluations to determine the National Register eligibility of archaeological sites should be in keeping with the National Park Service's 2000 National Register Bulletin, *Guidelines for Evaluating and Registering Archaeological Properties.* The *Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation* are available on the National Park Services web site: http://www.nps.gov/history/local-law/arch_stnds_0.htm).

21. Prior to project implementation, the permittee shall ensure that adverse effects to historic and archaeological resources shall be avoided, reduced, or mitigated through consultation between the New Jersey Historic Preservation Office; the U.S. Army Corps of Engineers as the lead Federal agency; and the permittee pursuant to Section 106 of the National Historic Preservation Act and its implementing regulations at 36 CFR §800. Upon completion of Section 106 Consultation, the permittee shall provide the Division of Land Use Regulation a copy of Section 106 comments together with a statement of how the comments have been incorporated into the project.

22. If project circumstances change so that consultation under Section 106 of the National Historic Preservation Act is no longer necessary, the permittee shall consult with the Division of Land Use Regulation and the New Jersey Historic Preservation Office, prior to project implementation, to ensure the provisions of N.J.A.C. 7:7E-3.36 are met.

23. Prior to installation of the turbines, the permittee shall submit revised pre- and post-construction monitoring survey protocols for birds, bats and marine organisms to the Division, for review and approval. Such protocols will be based on the methodology as detailed in the Department's "Technical Manual for Evaluating Wildlife Impacts of Wind Turbines Requiring Coastal Permits" dated September 7, 2010. Specifically, but not limited to:
    a. A BACI design shall be implemented for the pre-construction studies. The reference area shall be at least 3km from the maximum extent of the project area and be of similar size and shape to the project area. For the post-construction monitoring, the permittee may consider using both a BACI design, as well as an Impact Gradient (IG) methodology, as a means of assessing the efficacy of which is the more appropriate monitoring protocol for open water systems.
    b. The collection of new radar data shall be included in the protocol, for both pre- and post-construction at the project site as well as the reference site. Radar data shall be collected 24 hours per day from April 1 – May 31, and August 1 – November 30.
    c. Post-construction monitoring shall mimic the protocols of the pre-construction survey and, in addition, shall consider radar studies as a way of monitoring collisions or avoidance effects. Other methods such as the use of Forward Looking Infrared Radar (FLIR) shall also be considered. The post-construction survey period shall last 2 years. The permittee shall confer with the Department at least 6 months prior to the beginning of the post-construction phase to finalize protocols.
    d. An interim report of pre-construction monitoring results shall be submitted to the Department no later than 6 months following the conclusion of those surveys and a final report shall be submitted no later than 9 months following the conclusion of the post-construction surveys.

24. No permanent exterior light(s) shall be placed on the wind turbines, except for lighting approved by the Federal Aviation Administration and the United States Coast Guard. The type of lights to be used will be those that have been shown to not attract night migrant birds.

25. Curtailment of wind turbine operations may be required by the Department during peak spring (April through June) and fall (August through November) migration periods when migrating birds, bats and/or other wildlife would likely be flying at the height of the rotor swept area or be present at seasonally high densities throughout the entire air column. Such curtailment shall not exceed 360 hours in a calendar year per turbine that occurs within the normal range of operation of the turbine. Curtailment measures include establishing a minimum wind speed that must be achieved prior to starting operations and shutting down operations during certain weather conditions or migratory events. Weather conditions that may necessitate curtailment include low wind speeds, low altitude cloud cover, strong storms, or approaching weather fronts favorable to bird or bat migration (such as southerly winds in the spring or northwest winds in the fall). Migratory events that may necessitate curtailment include high concentrations of migrating birds and bats

using the coastal area (for example, high concentrations of shorebirds making daily flights between coastal feeding areas, such as mudflats, and roosting areas during spring migration).

26. As determined by the Department, limitations on operation shall be based on monitoring results and published and unpublished studies or data. The Department shall notify the permittee in writing of the operational limitations by March 15th of the first year curtailment is required during the spring migration and by July 15th of the first year curtailment is required during the fall migration. These operational limitations shall remain in effect unless the Department notifies the permittee in writing by the above dates in subsequent years that changes to operational limitations are required. This information shall also be made available on the Department's website at www. nj.gov/dep/landuse.

27. Records of all shut downs and start ups shall be maintained by Fishermen's Atlantic City Windfarm, LLC, and shall be available for inspection by the Department, upon request. These records shall include, but not be limited to, date and time of shut down/start up, and the name of the person supervising the activity.

28. The Fishermen's Atlantic City Windfarm, LLC shall ensure that all non-road construction equipment operated at, or visiting, the Fishermen's Atlantic City Windfarm, LLC comply with the 3 minute idling limit, pursuant to N.J.A.C. 7:27-14 and 15. Existing exemptions that allow idling while vehicles/equipment are conducting certain types of activities remain in effect.

29. The Fishermen's Atlantic City Windfarm, LLC shall ensure that all diesel non-road construction equipment used during the construction of the Fishermen's Atlantic City Windfarm, LLC use ultra-low sulfur fuel (<15 ppm sulfur) in accordance with the federal Nonroad Diesel Rule, 40 CFR Parts 9, 69, 80, 86, 89, 94, 1039, 1051, 1065, 1068.

30. The Fishermen's Atlantic City Windfarm, LLC shall ensure that all diesel non-road construction equipment greater than 100 horsepower used during the construction of the Fishermen's Atlantic City Windfarm, LLC has: engines that meet the USEPA Tier 4 non-road emission standards; or an engine that meets USEPA Tier 2 non-road emission standards plus the best available emission control that is technologically feasible for that application and verified by the USEPA or the California Air Resources Board (CARB) to reduce particulate matter emissions, subject to a. through c. below. A list of verified emission control technologies can be found at http://www.epa.gov/otaq/retrofit/verif-list.htm for USEPA and at http://www.arb.ca.gov/diesel/verdev/vt/cvt.htm for CARB.

    a. In the absence of a technologically feasible and appropriate control technology verified by USEPA or CARB for a particular diesel non-road construction equipment, Fishermen's Atlantic City Windfarm, LLC may allow the contractor to use the best available emission control technology verified by the Mine Safety and Health Administration and/or the Switzerland BUWAL program VERT Filter List to reduce particulate matter emissions (List (http://www.suva.ch or http://.umwelt-scheiz.ch/buwal/enbg/fachgebiete/fg_luft/vorschriften/industrie_gewerbe/filter/index.htm)

b. If the contractor demonstrates to the Fishermen's Atlantic City Windfarm, LLC's satisfaction that it is not feasible to use any control technology, or installation of a control technology would create a safety hazard, including impaired visibility for the operator, the Fishermen's Atlantic City Windfarm, LLC may grant a waiver from Condition 30 of this permit. The waiver can also be granted if problems arise with the control technology during the construction project.

c. Diesel non-road diesel construction equipment onsite for ten working days or less over the life of the project is not required to comply with Condition 30 of this permit.

31. Measures shall be implemented to minimize emissions from tugs, barges, and other marine vessels used during the construction of the turbines, including the use of Ultralow Sulfur Fuel and eliminating unnecessary idling. Marine vessels and equipment do not need to be retrofitted or repowered.

32. The Fishermen's Atlantic City Windfarm, LLC shall send bi-annual reports to NJDEP, Diesel Risk Reduction Program, PO Box 418, Trenton, N.J. 08625-0418, <u>during the construction phase of the project</u>. The bi-annual reports shall include summaries of the vehicles/equipment retrofitted, the types of retrofit devices used, any problems encountered with installation or operation of the devices, estimate of emissions reduced, and results of field audits or testing done to ensure compliance with these diesel emission reduction requirements. The reporting shall be done using forms on www.stopthesoot.org.

33. The permittee shall abide by the Federal General Conformity regulation at 40 CFR Part 93 Determining Conformity of Federal Actions To State Tribal or Federal Implementation Plans.

34. Any on-shore excavated material or dredged spoils shall be disposed of in a lawful manner outside of any flood hazard area riparian zone, open water, freshwater wetland and adjacent transition area, and in such a way as to not interfere with the positive drainage of the receiving area. Any off-shore excavated materials can remain in the vicinity of the excavation area.

35. The permittee shall immediately inform the Department of any unanticipated adverse effects on the environment not described in the application or in the conditions of this permit.

36. Consistency with the Areawide Water Quality Management Plan

The Division of Land Use Regulation has not reviewed this application for consistency with the Areawide Water Quality Management Plan and the issuance of this permit shall not be construed as an approval of any wastewater management plan for this project or site. There shall be no construction of any sewage generating structures unless and until the proposed development has been found to be consistent with the appropriate areawide water quality management plan.

Christopher Jones

Christopher Jones, Manager
Bureau of Urban Growth & Redevelopment
Division of Land Use Regulation

3/29/11
Date

c: NJDEP Bureau of Coastal and Land Use Enforcement, Toms River, attn: Harry Nicol
NJDEP Bureau of Tidelands Management, attn: Melissa Miller
NJDEP Division of Fish and Wildlife, attn: Kelly Davis
USACE Philadelphia District, attn: Lawrence Slavitter
Atlantic County Planning Board
City of Atlantic City Construction Official

APPENDIX G

RESPONSE TO EPA COMMENTS

Revised Conformity Analysis and Air Quality Tables

April 20, 2015

Memo

To:	Chuck Harmon, amec foster wheeler
From:	Lysa Modica, amec foster wheeler
Date:	April 20, 2015
Re.	DOE/EA-1970 Response to U.S. EPA Region 2 Comments

Background

The Fishermen's Atlantic City Windfarm (FACW) is a nominal 25 MW offshore pilot wind electric power generating and transmission facility to be constructed approximately 2.8 miles off the coast from Atlantic City, New Jersey. The project includes six (6) wind turbines, an underwater transmission cable system, transmission vaults, and AC interconnections to the Huron Substation located in Atlantic City, NJ. FACW will supply power to New Jersey via a dedicated transmission cable located in the waters of New Jersey. The FACW project is considered a Federal Action and is subject to review under the National Environmental Protection Act (NEPA).

The FACW project is located in the Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE Interstate Air Quality Control Region (AQCR) which is designated as moderate nonattainment for ozone and a maintenance area for $PM_{2.5.}$ In addition, the Project is also located in the Northeast Ozone Transport Region (OTR). Therefore, the Project must evaluate air emissions of ozone precursors (VOC and NO_x) as well as $PM_{2.5}$ and $PM_{2.5}$ precursors (NO_x and SO_2) from construction and operation of the Project and demonstrate compliance with the ozone State Implementation Plan (SIP) for New Jersey.

The wind turbines and transmission cable will be located in the waters of the State of New Jersey off of Atlantic City. The New Jersey transmission landfall transition and substation are located in Atlantic County, New Jersey. Under the Energy Policy Act of 2005 (EPAct 2005), air quality impacts from marine vessels and non-road equipment operating at offshore wind projects located in state waters are regulated under the General Conformity requirements.

During the initial permitting of the project (2009 to 2011), The US Army Corps of Engineers (USACE) prepared an Environmental Assessment (EA) which included a conformity applicability analysis for the project to determine whether a proposed action would be subject to the General Conformity Rule. Calculated emissions for construction and operation of FACW were below the General Conformity applicability thresholds and it was determined that the Project was not subject to the General Conformity provisions.

DOE is proposing to provide funding to FACW to support the development of the offshore wind renewable energy facility within New Jersey State Waters. Due to project changes since the completion of permitting, a new EA is being prepared by DOE. This memorandum addresses

U.S. EPA Region 2's April 15, 2015 comments on the conformity analysis and the impacts of the project on climate change.

Summary of U.S. EPA Comments

A summary of U.S. EPA's comments are provided below. Subsequent sections of this memorandum address each comment.

Comment 1: Emissions presented in the general conformity Section 3 of the 2015 EA do not correspond to those provided in the appendix. U.S. EPA has requested that this be clarified.

Comment 2: The use of Tier 3 emission factors for nonroad engines to reflect a combination of Tier 2 and Tier 4 engines will result in an underestimation of NO_x and an overestimation of particulate matter. U.S. EPA requested DOE to re-evaluate the assumptions and emission factors used to estimate NO_x emissions from nonroad engines.

Comment 3: The on-road analysis used MOBILE6.2, which was the model in use at the time of the original evaluation. U.S. EPA noted that MOVES is the currently approved mobile source emissions model.

Comment 4: U.S. EPA noted that the Council on Environmental Quality (CEQ) updated their draft guidance on addressing greenhouse gas (GHG) emissions and climate change in NEPA reviews December 18, 2014.

Comment 1

The emissions presented in the appendix reflect an earlier analysis prior to changes in the construction method and schedule. Therefore, this should not be used. Section 3 of the EA and the revisions presented in this response to comments will replace the appendix in its entirety. Updated emissions tables reflecting all comments are provided in Attachment 1. All assumptions in Section 3 regarding equipment types, sizes and activity factors remain the same.

Comment 2

Emissions calculations from nonroad equipment using NONROAD2008 were revised to reflect a worst case methodology. In the case of NO_x, emissions were revised to reflect Tier 2 factors for all nonroad equipment. $PM_{2.5}$ and PM_{10} continue to be based on Tier 3 factor since the Tier 3 $PM_{2.5}$ and PM_{10} factors reflect a more conservative estimate than Tier 2. THC (VOC), CO and SO_2 emissions still reflect the Tier 3 factors previously used as there is minimal difference between the two for the project equipment.

Based on the revised emissions presented in Attachment 1, the project is not subject to the General Conformity provisions and a Record of Non-Applicability (RONA) can be issued by DOE.

Comment 3

Mobile source emissions for on-road sources were revised using MOVES2010 for all pollutants, including GHGs. The results of this analysis are provided in Attachment 1, Tables 1 and 4. MOVES was run using four vehicle types and four road types:

- 52 – single unit short haul truck

Continued…

- 53– single unit long haul truck
- 61– combination short haul truck
- 62– combination short haul truck
- 2– rural restricted road
- 3– rural unrestricted road
- 4– urban restricted road
- 5– urban unrestricted road

In addition to the vehicle and road types, MOVES also calculates emissions by 16 speed bins reflecting travel speeds of 2.5 miles per hour to 75 miles per hour, with the highest emissions occurring at the lowest travel speed. Due to the large size of the MOVES output, July was selected to reflect the maximum volatile emission rates. As a conservative estimate, the maximum criteria pollutant emission factors for all days, hours, road types, and all vehicle types for speed bin 1 (<2.5 mph) were used to estimate the mobile source criteria pollutant emissions from project construction for comparison to conformity thresholds. This is very conservative since the NJDEP permit for the project limits idling to no more than three minutes. A summary of the worst case MOVES emission factors are provided in Attachment 2.

For CO_2e, an average of the worst case emission factors over all vehicle and road types was used to estimate emissions. The average is 6,268 grams per mile over all speed classes.

Again, based on the revised emissions, the project is not subject to the General Conformity provisions and a RONA can be issued by DOE.

Comment 4

The GHG analysis presented in the EA had been conducted prior to the December 2014 CEQ guidance and was based on an earlier 2010 CEQ draft of the guidance. To address comments received from U.S. EPA Region 2 concerning the analysis presented in the draft EA, GHG emissions from the construction and operation of the FACW offshore wind farm were evaluated using the December 20134 CEQ guidance. To comply with the CEQ draft December 2014 GHG emissions guidelines, anticipated GHG emissions from the construction and operation of the project were evaluated. In addition, GHG emissions reductions from displacing combustion-generated electricity with wind generated electricity were quantified to assess the action versus no action alternative on GHG emissions.

CEQ guidelines recommend that a GHG analysis take into account both the short- and long-term effects and benefits over the life of a project and the duration of the generation of emissions. In addition, CEQ guidelines provide a reference point of 25,000 metric tons of CO_2e for analysis under the guidelines. CEQ notes that the 25,000 metric ton reference point is not an applicability threshold and projects with emissions below this level may still require evaluation. As demonstrated below, project emissions are well below 25,000 metric tons. However, an analysis of the project on GHG emissions is presented below. (Note that emissions are provided in tons in the tables below. A metric ton is equal to 0.91 short tons.)

The primary source of GHG emissions from the project are those related to construction of the wind turbines, underwater cable, and upland connection. Some emissions are expected to also occur during operations to allow for maintenance and repair of the wind turbines.

Continued…

GHG emissions from the construction of the project were calculated for marine vessels, nonroad equipment, on-road mobile sources, and a stationary generator. Emissions factors used in this analysis and the resulting emissions are presented in revised Tables 1 through 9 provided in Attachment 1. Following is a discussion of the emission factors used to estimate GHG emissions from the project.

Marine vessels: GHG emission factors from marine vessels are based on U.S. EPA's "Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories", April 2009. Emission factors used in this analysis are provided in Table 1 below. Global Warming Potentials (GWPs) based on 40 CFR 98 Subpart A were used to calculate the CO_2e and are as follows: CO_2 – 1; CH_4 – 25; and N_2O – 298.

Table 1 GHG Emissions Factors for Marine Vessels

CO_2	**CH_4**	**N_2O**
(g/kWh)	**(g/kWh)**	**(g/kWh)**
690	0.09	0.02

Nonroad equipment: NONROAD2008 provides emission factors for CO_2 only (530.12 g/hp-hr). While this may slightly underestimate CO2e from nonroad engines, the potential CO_2 emissions for nonroad engines are less than 1,500 tons and the CH_4 and N_2O portions tend to be very small in comparison to CO_2. Therefore, CO_2 was used as a surrogate in this analysis.

Stationary generator: GHG emissions from the stationary generator were calculated using 40 CFR 98 Subpart C, Tables C-1 and C-2 and the GWPs from Subpart A.

On-road mobile sources: CO_2e emissions for on-road mobile sources were obtained from the MOVES model for Tier 2 engines and the vehicle miles traveled.

GHG emissions for construction of the project were estimated to be 23,000 tons per year using a conservative emission factor. During operation of the project, GHG emissions were estimated to be 513 tons per year.

GHG emissions reductions from displacing combustion-generated electricity in New Jersey with wind generated electricity were quantified and compared to GHG emissions from construction and operation of the project. The basis for the GHG emissions from electricity generation from combustion sources used in this evaluation is the U.S. EPA's Emissions & Generation Resource Integrated Database for 2010 (eGRID2010). EPA's eGrid2010 database is a comprehensive inventory of emissions and electricity generation for the U.S. power sector for the calendar year 2010, currently the most recent year available in eGRID. This analysis used the eGRID emissions factors in lb/MWh for CO_2, CH_4, and N_2O for electricity generated by combustion sources in New Jersey. GWPs are based on 40 CFR 98 Subpart A. A summary of the GHG emissions avoided as a result of the project are provided in Table 2.

Continued…

Table 2. Estimated Displaced GHG Emissions for a 25 MW Wind Farm in New Jersey

	Lb/MWh	MWh/year	Tons/Year	Lifetime Tons[1]
CO_2	1,227.10	68,571	42,072	1,051,800
CH_4	0.04	68,571	1.54	35
N_2O	0.01	68,571	0.43	10
CO_2e	1227.16	68,571	42,238	1,055,949

[1] Lifetime tons assumes a 25 year operational lifetime for the wind farm.

The annual capacity factor used to estimate the annual megawatts generated by the wind farm is 31% based on an earlier study conducted for the wind farm. This capacity factor is within the range estimated by the New Jersey Board of Public Utilities and the National Renewable Energy Lab (in conjunction with the Bureau of Ocean Energy Management) for New Jersey offshore wind farms.

The results of this analysis show that the GHG emissions from construction and operation of the project (build alternative) of 23,000 and 500 tons, respectively will be significantly less than the GHG emissions displaced by the wind farm (no build alternative) in a single operational year (42,238 tons) and over the lifetime of the project (1,055,949). Therefore, the project will result in decreased GHG emissions once operational.

The effects of climate change on the project include the potential for more severe storms and a rise in sea level. Engineering design of the structures requires that all components are able to withstand environmental conditions experienced during a 100-year return interval storm event. Based on historical studies of site conditions and a MetOcean Solutions Ltd report developed specifically for this project area, the 100 year storm conditions present maximum wind speeds of 112 miles per hour (mph) and maximum wave heights of 37 feet.

Continued…

ATTACHMENT 1

REVISED EMISSIONS CALCULATIONS FOR CONFORMITY AND GHGS

Table 1. Project Emissions Summary

Project Emission Totals (TPY)							
Source Category	**THC**	**NOx**	**PM10**	**PM2.5**	**CO**	**SO2**	**CO2e**
Nonroad	0.479	11.047	0.506	0.493	3.240	0.013	1443.4
Marine	1.26	53.16	1.40	1.36	23.35	6.07	2,964.4
Mobile	0.044	0.420	0.00727	0.00668	0.185	0.00405	18779.0
Generator	0.00042	0.197	0.006	0.006	0.109	0.00042	23.85
TOTALS	**1.78**	**64.83**	**1.92**	**1.86**	**26.88**	**6.09**	**23,210.7**

Upland Emission Totals (TPY)							
Source Category	**THC**	**NOx**	**PM10**	**PM2.5**	**CO**	**SO2**	**CO2e**
Nonroad	0.174	3.854	0.217	0.208	1.644	0.0048	517.3
Marine	0.028	1.239	0.032	0.031	0.528	0.137	73.69
Mobile	0.044	0.420	0.00727	0.00668	0.185	0.00405	18,779.0
Generator	0.00042	0.1969	0.0063	0.0063	0.1089	0.00042	23.85
TOTALS	**0.25**	**5.71**	**0.26**	**0.25**	**2.46**	**0.15**	**19,393.8**

Offshore Emission Totals (TPY)							
Source Category	**THC**	**NOx**	**PM10**	**PM2.5**	**CO**	**SO2**	**CO2e**
Nonroad	0.304	7.193	0.289	0.285	1.596	0.009	926.2
Marine	1.08	44.58	1.20	1.17	20.04	5.21	2,890.7
Marine Travel	0.15	7.34	0.17	0.16	2.78	0.72	388.4
TOTALS	**1.54**	**59.12**	**1.66**	**1.61**	**24.42**	**5.94**	**4,205.3**

Operational Marine Vessel Emission Totals (TPY)							
Source Category	**THC**	**NOx**	**PM10**	**PM2.5**	**CO**	**SO2**	**CO2e**
Ferry	0.20	7.35	0.22	0.21	3.68	0.96	513.4
TOTALS	**0.20**	**7.35**	**0.22**	**0.21**	**3.68**	**0.96**	**513.4**

Note: NONROAD emissions of GHG are based on CO2 from NONROAD2008 output.

Table 2. Upland Nonroad Source Emissions

Emission Factors and Operating Limits														
Engine Description	Rating (hP)	Number	Total hP	Hours Per Day	Days Per Year	Tier	Load Factor	THC (g/hp·hr)	NOx (g/hp·hr)	PM10 (g/hp·hr)	PM2.5 (g/hp·hr)	CO (g/hp·hr)	SO2 (g/hp·hr)	CO2 (g/hp·hr)
Horizontal Directional Drill Rig	700	2	1400	10	55	2,3	0.59	0.17	3.88	0.22	0.21	2.03	0.00493	530.12
Tulsa Iron Triplex Pump	540	1	540	10	55	2,3	0.43	0.17	4.10	0.15	0.150	0.84	0.00487	530.12
CAT 345CL Excavator	600	2	1200	10	30	2,3	0.59	0.17	3.88	0.22	0.210	1.29	0.00487	530.12
CAT 325CL Excavator	300	1	300	10	30	2,3	0.59	0.19	3.88	0.22	0.210	1.14	0.00487	530.12
CAT IT28 Wheel Loader	131	1	131	10	55	2,3	0.21	0.42	4.52	0.52	0.500	2.23	0.00487	530.12
CAT 420DIT Backhoe	93	1	93	10	55	2,3	0.21	0.42	5.19	0.71	0.690	6.08	0.00487	530.12
Cable Winch	50	1	50	10	55	2,3	0.43	0.18	4.70	0.30	0.290	2.37	0.00487	530.12

Note: The HDD rig and Triplex pump emissions were estimated using the NONROAD2008 category "Diesel Trenchers".
Note: The Cable Winch emissions were estimated using the NONROAD2008 category "Diesel Cranes".
Note: The Triplex pump emissions were estimated using ther NONROAD2008 category
Note: Emissions are based on Tier 3 with the exception of NOx, which is based on Tier 2 to reflect worst case emissions.

Emissions														
	THC		NOx		PM10		PM2.5		CO		SO2		CO2	
Engine Description	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
Horizontal Directional Drill Rig	0.31	0.08513	7.07	1.94299	0.40	0.11017	0.38	0.10516	3.70	1.01657	0.0090	0.00247	965.4	265.5
Tulsa Iron Triplex Pump	0.09	0.02393	2.10	0.57717	0.08	0.02112	0.08	0.02112	0.43	0.11825	0.0025	0.00069	271.4	74.6
CAT 345CL Excavator	0.27	0.03980	6.06	0.90841	0.34	0.05151	0.33	0.04917	2.01	0.30202	0.0076	0.00114	827.4	124.1
CAT 325CL Excavator	0.07	0.01112	1.51	0.22710	0.09	0.01288	0.08	0.01229	0.44	0.06673	0.0019	0.00029	206.9	31.0
CAT IT28 Wheel Loader	0.03	0.00700	0.27	0.07539	0.03	0.00867	0.03	0.00834	0.14	0.03719	0.0003	0.00008	32.2	8.8
CAT 420DIT Backhoe	0.02	0.00497	0.22	0.06145	0.03	0.00841	0.03	0.00817	0.26	0.07199	0.0002	0.00006	22.8	6.3
Cable Winch	0.01	0.00235	0.22	0.06126	0.01	0.00391	0.01	0.00378	0.11	0.03089	0.0002	0.00006	25.1	6.9
TOTALS	**0.788**	**0.174**	**17.455**	**3.854**	**0.983**	**0.217**	**0.943**	**0.208**	**7.094**	**1.644**	**0.022**	**0.0048**	**2351.1**	**517.3**

Table 3. Upland Marine Source Emissions

Emission Factors and Operating Limits														
Vessel Description	**Rating (hp)**	**(kW)**	**Hours Per day**	**Days Per Year**	**# Vessels**	**Total kW**	**Load Factor**	**THC (g/kWh)**	**NOx (g/kWh)**	**PM10 (g/kWh)**	**PM2.5 (g/kWh)**	**CO (g/kWh)**	**SO2 (g/kWh)**	**CO2e (g/kWh)**
Tug	1,200	895	10	20	1	895	0.31	0.27	13	0.3	0.29	5	1.3	See
Crew Boat	600	447	10	20	1	447	0.45	0.27	10	0.3	0.29	5	1.3	Below

Note: * Marine emission factors based on U.S. EPA's "Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories", April 2009.
* SO2 emission factors are conservatively based on 1.5% fuel oil sulfur content for harbor craft.

Emissions														
Vessel	**THC**		**NOx**		**PM10**		**PM2.5**		**CO**		**SO2**		**CO2e**	
Description	**(lb/hr)**	**(tpy)**	**(lb/hr)**	**(tpy)**	**(lb/hr)**	**(tpy)**	**(lb/hr)**	**(tpy)**	**(lb/hr)**	**(tpy)**	**(lb/hr)**	**(tpy)**	**(lb/hr)**	**(tpy)**
Tug	0.17	0.02	7.95	0.80	0.18	0.02	0.18	0.02	3.06	0.31	0.80	0.08	427.00	42.70
Crew Boat	0.12	0.01	4.44	0.44	0.13	0.01	0.13	0.01	2.22	0.22	0.58	0.06	309.92	30.99
TOTALS	**0.28**	**0.03**	**12.39**	**1.24**	**0.32**	**0.03**	**0.31**	**0.03**	**5.28**	**0.53**	**1.37**	**0.14**	**736.92**	**73.69**

CO2	**CH4**	**N2O**
(g/kWh)	**(g/kWh)**	**(g/kWh)**
690	0.09	0.02

CO2	**CH4**	**N2O**	
(lb/hr)	**(lb/hr)**	**(lb/hr)**	
422	0.055	0.012	Tug
306	0.040	0.009	Crew

Table 4. Upland Mobile Source Emissions

Emission Factors and Operating Limits													
Vehicle	**Number**	**Rating (hp)**	**Total hp**	**Trips Per Day**	**Trips Per Year**	**Trip Length (mi)**	**VOC (g/mile)**	**NOx (g/mile)**	**PM10 (g/mile)**	**PM2.5 (g/mile)**	**CO (g/mile)**	**SO2 (g/mile)**	**CO2e (g/mile)**
Support Trucks	6	100	600	4	135	20	2.161	20.447	0.354	0.325	8.99	0.197	6,368.0
Tractor Trailer	1	515	515	2	61	20	2.161	20.447	0.354	0.325	8.99	0.197	6,368.0
Tandem Dump Truck	1	350	350	4	61	20	2.161	20.447	0.354	0.325	8.99	0.197	6,368.0

Emissions														
	VOC		**NOx**		**PM10**		**PM2.5**		**CO**		**SO2**		**CO2e**	
Vehicle	**(lb/day)**	**(tpy)**	**(lb/day)**	**(tpy)**	**(lb/day)**	**(tpy)**	**(lb/day)**	**(tpy)**	**(lb/day)**	**(tpy)**	**(lb/day)**	**(tpy)**	**(ton/day)**	**(tpy)**
Support Trucks	2.287	0.03859	21.637	0.36513	0.375	0.00632	0.344	0.00580	9.513	0.16054	0.2085	0.00352	336.9	11,371.4
Tractor Trailer	0.191	0.00291	1.803	0.02750	0.031	0.00048	0.029	0.00044	0.793	0.01209	0.0174	0.00026	144.6	4,410.3
Tandem Dump Truck	0.381	0.00291	3.606	0.02750	0.062	0.00048	0.057	0.00044	1.586	0.01209	0.0347	0.00026	196.5	2,997.3
TOTALS	**2.858**	**0.044**	**27.046**	**0.420**	**0.468**	**0.00727**	**0.430**	**0.00668**	**11.892**	**0.185**	**0.2606**	**0.00405**	**678.1**	**18,779.0**

Table 5. Upland Generator Engine Emissions

Emission Factors and Operating Limits							
Rating (hp)	Hours Per Year	THC (g/hp)	NOx (g/hp)	PM10 (g/hp)	PM2.5 (g/hp)	CO (g/hp)	SO2 (g/hp)
38	1000	0.01	4.7	0.15	0.15	2.6	0.01

Emissions													
THC		NOx		PM10		PM2.5		CO		SO2		CO2e	
(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
0.0008	0.0004	0.394	0.197	0.0126	0.0063	0.0126	0.0063	0.218	0.109	0.0008	0.0004	47.71	23.85

CO2	CH4	N2O
(lb/MMBtu)	(lb/MMBtu)	(lb/MMBtu)
174.96	0.006614	0.001323
lb/hr	lb/hr	lb/hr
47.56	1.80E-03	3.60E-04
tpy	tpy	tpy
23.78	8.99E-04	1.80E-04

MMBtu/hr
0.271814

lb/MMBtu based on factors in 40 CFR 98 Tables C-1 and C-2

Table 6. Offshore Nonroad Source Emissions

Emission Factors and Operating Limits														
Engine Description	Rating (hP)	Number	Total hP	Hours Per Day	Days Per Year	Tier	Load Factor	THC (g/hp·hr)	NOx (g/hp·hr)	PM10 (g/hp·hr)	PM2.5 (g/hp·hr)	CO (g/hp·hr)	SO2 (g/hp·hr)	CO2 (g/hp·hr)
Deck Barge Anchor Winch	300	2	600	24	37	2	0.43	0.18	4.00	0.22	0.210	0.87	0.00487	530.12
Deck Barge Cable Plow Pump	298	1	298	24	27	2	0.43	0.18	4.00	0.15	0.150	0.75	0.00487	530.12
Deck Barge Cable Engine	120	2	240	24	27	2	0.43	0.18	4.70	0.30	0.290	2.37	0.00487	530.12
Deck Barge 50 Ton Hydraulic Crane	102	1	102	24	37	2	0.43	0.18	4.10	0.22	0.210	0.87	0.00487	530.12
Deck Barge Dive Compressor	22.5	1	22.5	24	37	2	0.43	0.44	4.44	0.27	0.260	2.16	0.00487	530.12
Deck Barge Divers Jet Pump	68	1	68	24	37	2	0.43	0.18	4.70	0.30	0.290	2.37	0.00487	530.12
Deck Barge Air Compressor	440	1	440	24	37	2	0.43	0.17	4.10	0.15	0.150	0.84	0.00487	530.12
JU Barge 1 Jacking System	544	2	1088	24	25	2	0.43	0.17	4.10	0.15	0.150	0.84	0.00487	530.12
JU Barge 1 Crane	1000	1	1000	24	25	2	0.43	0.17	4.10	0.13	0.130	0.76	0.00487	530.12
Floating Derrick Crane	800	1	800	24	25	2	0.43	0.17	4.10	0.13	0.130	0.76	0.00487	530.12
JU Barge 2 Jacking System	425	2	850	24	25	2	0.43	0.17	4.10	0.15	0.150	0.84	0.00487	530.12

Note: Except for the cranes NONROAD2008, factors based on "Diesel Bore/Drill Rig" category. The cranes used the NONROAD2008 "Diesel Crane Category".

Note: The deck barge cable plow pump and engine will be used for the underwater cable only and will therefore be used for a 27 day period.

Note: Emissions are based on Tier 3 with the exception of NOx, which is based on Tier 2 to reflect worst case emissions.

Emissions														
	THC		NOx		PM10		PM2.5		CO		SO2		CO2	
Engine Description	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
Deck Barge Anchor Winch	0.10	0.04546	2.28	1.01016	0.13	0.05556	0.12	0.05303	0.49	0.21971	0.0028	0.00123	301.5	133.9
Deck Barge Cable Plow Pump	0.05	0.01648	1.13	0.36611	0.04	0.01373	0.04	0.01373	0.21	0.06865	0.0014	0.00045	149.8	48.5
Deck Barge Cable Engine	0.04	0.01327	1.07	0.34646	0.07	0.02211	0.07	0.02138	0.54	0.17470	0.0011	0.00036	120.6	39.1
Deck Barge 50 Ton Hydraulic Crane	0.02	0.00773	0.40	0.17602	0.02	0.00944	0.02	0.00902	0.08	0.03735	0.0005	0.00021	51.3	22.8
Deck Barge Dive Compressor	0.01	0.00417	0.09	0.04205	0.01	0.00256	0.01	0.00246	0.05	0.02046	0.0001	0.00005	11.3	5.0
Deck Barge Divers Jet Pump	0.01	0.00515	0.30	0.13452	0.02	0.00859	0.02	0.00830	0.15	0.06783	0.0003	0.00014	34.2	15.2
Deck Barge Air Compressor	0.07	0.03148	1.71	0.75930	0.06	0.02778	0.06	0.02778	0.35	0.15556	0.0020	0.00090	221.1	98.2
JU Barge 1 Jacking System	0.18	0.05260	4.23	1.26861	0.15	0.04641	0.15	0.04641	0.87	0.25991	0.0050	0.00151	546.8	164.0
JU Barge 1 Crane	0.16	0.04835	3.89	1.16601	0.12	0.03697	0.12	0.03697	0.72	0.21614	0.0046	0.00138	502.5	150.8
Floating Derrick Crane	0.13	0.03868	3.11	0.93280	0.10	0.02958	0.10	0.02958	0.58	0.17291	0.0037	0.00111	402.0	120.6
JU Barge 2 Jacking System	0.14	0.04109	3.30	0.99110	0.12	0.03626	0.12	0.03626	0.68	0.20306	0.0039	0.00118	427.2	128.1
TOTALS	**0.91**	**0.30**	**21.51**	**7.19**	**0.84**	**0.29**	**0.83**	**0.28**	**4.72**	**1.60**	**0.03**	**0.0085**	**2768.3**	**926.2**

Table 7. Offshore Marine Source Emissions

Emission Factors and Operating Limits														
Vessel Description	Rating (hp)	(kW)	Hours Per day	Days Per Year	# Vessels	Total kW	Load Factor	THC (g/kWh)	NOx (g/kWh)	PM10 (g/kWh)	PM2.5 (g/kWh)	CO (g/kWh)	SO2 (g/kWh)	CO2e (g/kWh)
Tug	4,000	2,983	24	61	1	2,983	0.31	0.27	9.8	0.3	0.29	5	1.3	See
Tug	3,000	2,237	24	61	1	2,237	0.31	0.27	13.2	0.3	0.29	5	1.3	Below
Tug	700	522	24	61	1	522	0.31	0.27	13.2	0.3	0.29	5	1.3	
Tug	700	522	24	30	1	522	0.31	0.27	13	0.3	0.29	5	1.3	
Crew Boat	1,800	1,342	24	63	1	1,342	0.45	0.27	10	0.3	0.29	5	1.3	

Note: * Marine emission factors based on U.S. EPA's "Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories", April 2009.
* SO2 emission factors are conservatively based on 1.5% fuel oil sulfur content for harbor craft.
*For load factors for the tug boats, it was conservatively assumed that the largest tug will be used to transport thepiles and and other parts to the wind farm as this results in the highest emission factors. See Table 3-4).
*The tug and crew boats will also be used to assist with cable laying.
* As a worst case estimate, the small craft was also assumed to use diesel fuel at 1.5% sulfyr.

Emissions														
Vessel	THC		NOx		PM10		PM2.5		CO		SO2		CO2e	
Description	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
Tug	0.55	0.40	19.98	14.62	0.61	0.45	0.59	0.43	10.19	7.46	2.65	1.94	2989.0	2187.9
Tug	0.41	0.30	20.18	14.77	0.46	0.34	0.44	0.33	7.64	5.60	1.99	1.45		
Tug	0.10	0.07	4.71	3.45	0.11	0.08	0.10	0.08	1.78	1.31	0.46	0.34		
Tug	0.10	0.03	4.64	1.67	0.11	0.04	0.10	0.04	1.78	0.64	0.46	0.17		
Crew Boat	0.36	0.27	13.32	10.07	0.40	0.30	0.39	0.29	6.66	5.03	1.73	1.31	929.6	702.8
TOTALS	**1.52**	**1.08**	**62.82**	**44.58**	**1.68**	**1.20**	**1.63**	**1.17**	**28.06**	**20.04**	**7.30**	**5.21**	**3918.6**	**2890.7**

CO2	CH4	N2O
(g/kWh)	(g/kWh)	(g/kWh)
690	0.09	0.02

CO2	CH4	N2O
(lb/hr)	(lb/hr)	(lb/hr)
2,954	0.385	0.086
919	0.120	0.027

Tugs	6,264	kW
Crew	1342	kW

Table 8. Marine Travel Emissions

Emission Factors and Operating Limits															
	Rating						Load	THC	NOx	PM10	PM2.5	CO	SO2	CO2e	
Vessel Description	(hp)	(kW)	Travel Time (Hours)	# of Trips	# Vessels	Total Travel Time (Hours)	Factor	(g/kWh)	(g/kWh)	(g/kWh)	(g/kWh)	(g/kWh)	(g/kWh)	(g/kWh)	Comments
Jacket Tug	4,000	2,983	22.4	1	1	22.4	0.68	0.27	13.2	0.3	0.29	5	1.3		Roundtrip: Elizabeth to Atlantic City (206 ocean miles)
Turbine Small Tug	3,000	2,237	19.8	1	2	39.5	0.68	0.27	13.2	0.3	0.29	5	1.3	See	Elizabeth to Camden mobilization (182 miles) - Ocean Travel
Turbine Small Tug	3,000	2,237	7.2	1	2	14.3	0.31	0.27	13.2	0.3	0.29	5	1.3		Elizabeth to Camden mobilization (66 miles) - River Travel
Turbine Small Tug	3,000	2,237	17.2	3	2	103.0	0.68	0.27	13.2	0.3	0.29	5	1.3	Below	3 Roundtrips: Camden to Atlantic City (Ocean travel 158 miles round trip)
Turbine Small Tug	3,000	2,237	14.3	3	2	86.0	0.31	0.27	13.2	0.3	0.29	5	1.3		3 Roundtrips: Camden to Atlantic City (River travel 132 miles round trip)
Turbine Small Tug	3,000	2,237	11.2	1	2	22.4	0.68	0.27	13.2	0.3	0.29	5	1.3		Atlantic City to Elizabeth to demobilize (103 ocean miles)
Large Turbine Tug	4,000	2,983	22.4	1	1	22.4	0.68	0.27	13.2	0.3	0.29	5	1.3		Round trip Elizabeth to Atlantic City (206 ocean miles total)
Cable Large Tug	4,000	2,983	11.2	1	1	11.2	0.68	0.27	13.2	0.3	0.29	5	1.3		Elizabeth to Atlantic City (103 ocean miles)
Cable Large Tug	4,000	2,983	8.6	1	1	8.6	0.68	0.27	13.2	0.3	0.29	5	1.3		Atlantic City to Camden to offload material (79 ocean miles)
Cable Large Tug	4,000	2,983	7.2	1	1	7.2	0.31	0.27	13.2	0.3	0.29	5	1.3		Atlantic City to Camden to offload material (66 river miles)
Cable Large Tug	4,000	2,983	19.8	1	1	19.8	0.68	0.27	13.2	0.3	0.29	5	1.3		Camden to Elizabeth for demobilization (182 ocean miles)
Cable Large Tug	4,000	2,983	7.2	1	1	7.2	0.31	0.27	13.2	0.3	0.29	5	1.3		Camden to Elizabeth for demobilization (66 river miles)

Note: * Marine emission factors based on U.S. EPA's "Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories", April 2009.
* SO2 emission factors are conservatively based on 1.5% fuel oil sulfur content for harbor craft.
*For load factors for the tug boats, it was conservatively assumed that the largest tug will be used to transport the piles and and other parts to the wind farm as this results in the highest emission factors. See Table 3-4). Ocean travel used a load factor of 0.68. Travel on the Delaware River used a load factor of 0.31
*The travel time for each vessel is based on the number of miles traveled (x2 where roundtrip) divided by 9.206 mph (8 knots).
*The total travel time (hours) is based on the travel time times the # trips times # vessels.

	Emissions											
	THC		**NOx**		**PM10**		**PM2.5**		**CO**		**SO2**	
Vessel Description	**(lb/hr)**	**(tpy)**	**(lb/hr)**	**(tpy)**	**(lb/hr)**	**(tpy)**	**(lb/hr)**	**(tpy)**	**(lb/hr)**	**(tpy)**	**(lb/hr)**	**(tpy)**
Jacket Tug	1.21	1.35E-02	59.03	6.60E-01	1.34	1.50E-02	1.30	1.46E-02	22.36	2.50E-01	5.81	6.50E-02
Turbine Small Tug	0.91	1.79E-02	44.27	8.75E-01	1.01	1.99E-02	0.98	1.93E-02	16.77	3.32E-01	4.36	8.62E-02
Turbine Small Tug	0.41	2.96E-03	20.18	1.45E-01	0.46	3.29E-03	0.44	3.19E-03	7.64	5.48E-02	1.99	1.42E-02
Turbine Small Tug	0.91	4.66E-02	44.27	2.28E+00	1.01	5.18E-02	0.98	5.02E-02	16.77	8.63E-01	4.36	2.24E-01
Turbine Small Tug	0.41	1.78E-02	20.18	8.68E-01	0.46	1.97E-02	0.44	1.91E-02	7.64	3.29E-01	1.99	8.55E-02
Turbine Small Tug	0.91	1.01E-02	44.27	4.95E-01	1.01	1.13E-02	0.98	1.09E-02	16.77	1.88E-01	4.36	4.88E-02
Large Turbine Tug	1.21	1.35E-02	59.03	6.60E-01	1.34	1.50E-02	1.30	1.46E-02	22.36	2.50E-01	5.81	6.50E-02
Cable Large Tug	1.21	6.75E-03	59.03	3.30E-01	1.34	7.50E-03	1.30	7.28E-03	22.36	1.25E-01	5.81	3.25E-02
Cable Large Tug	1.21	5.18E-03	59.03	2.53E-01	1.34	5.76E-03	1.30	5.58E-03	22.36	9.59E-02	5.81	2.49E-02
Cable Large Tug	0.55	1.97E-03	26.91	9.65E-02	0.61	2.19E-03	0.59	2.13E-03	10.19	3.65E-02	2.65	9.50E-03
Cable Large Tug	1.21	1.19E-02	59.03	5.83E-01	1.34	1.33E-02	1.30	1.29E-02	22.36	2.21E-01	5.81	5.75E-02
Cable Large Tug	0.55	1.97E-03	26.91	9.65E-02	0.61	2.19E-03	0.59	2.13E-03	10.19	3.65E-02	2.65	9.50E-03
TOTALS	**10.68**	**0.15**	**522.12**	**7.34**	**11.87**	**0.17**	**11.51**	**0.16**	**197.77**	**2.78**	**51.42**	**0.72**

Note: lb/hr = lb/hr per vessel; tpy= total tpy for all vessels on that travel leg

	Emissions							
Vessel Description	CO2		CH4		N2O		CO2e	
	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
Jacket Tug	3,085.4	34.5	0.402	0.005	0.089	1.00E-03	3122.1	34.9
Turbine Small Tug	2,314.1	45.7	0.302	0.006	0.067	1.33E-03	2341.6	46.3
Turbine Small Tug	1,054.9	7.6	0.138	0.001	0.031	2.19E-04	1067.5	7.7
Turbine Small Tug	2,314.1	119.1	0.302	0.016	0.067	3.45E-03	2341.6	120.6
Turbine Small Tug	1,054.9	45.4	0.138	0.006	0.031	1.32E-03	1067.5	45.9
Turbine Small Tug	2,314.1	25.9	0.302	0.003	0.067	7.50E-04	2341.6	26.2
Large Turbine Tug	3,085.4	34.5	0.402	0.005	0.089	1.00E-03	3122.1	34.9
Cable Large Tug	3,085.4	17.3	0.402	0.002	0.089	5.00E-04	3122.1	17.5
Cable Large Tug	3,085.4	13.2	0.402	0.002	0.089	3.84E-04	3122.1	13.4
Cable Large Tug	1,406.6	5.0	0.183	0.001	0.041	1.46E-04	1423.3	5.1
Cable Large Tug	3,085.4	30.5	0.402	0.004	0.089	8.84E-04	3122.1	30.9
Cable Large Tug	1,406.6	5.0	0.183	0.001	0.041	1.46E-04	1423.3	5.1
TOTALS	27,292.5	383.9	3.6	0.05	0.79	0.011	27617.2	388.4

CO2	**CH4**	**N2O**
(g/kWh)	**(g/kWh)**	**(g/kWh)**
690	0.09	0.02

Table 9. Operational Marine Vessel Emissions

Marine Vessels for Wind Turbine Maintenance												
Vessel Type	Capacity (hp)	Capacity (kW)	No. of Engines	Total kW	Load Factor	THC (g/kWh)	NOx (g/kWh)	PM10 (g/kWh)	PM2.5 (g/kWh)	CO (g/kWh)	SO2 (g/kWh)	CO2e (g/kWh)
Ferry	500	372.85	2	745.70	0.42	0.27	10	0.3	0.29	5	1.3	see below

Note: * Marine emission factors based on U.S. EPA's "Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories", April 2009.
* SO2 emission factors are conservatively based on 1.5% fuel oil sulfur content for harbor craft.

Marine Vessels for Wind Turbine Maintenance										
Vessel Type	Capacity (kW)	Hours per Day	Activity Factor	THC (lb/hr)	NOx (lb/hr)	PM10 (lb/hr)	PM2.5 (lb/hr)	CO (lb/hr)	SO2 (lb/hr)	CO2e (lb/hr)
Ferry	745.70	10	0.42	0.19	6.90	0.21	0.20	3.45	0.90	482.1

Operational Marine Vessels TPY										
Vessel Type	Capacity (kW)	Hours per Year	Activity Factor	THC tpy	NOx tpy	PM10 tpy	PM2.5 tpy	CO tpy	SO2 tpy	CO2e tpy
Ferry	745.70	2130	0.42	0.20	7.35	0.22	0.21	3.68	0.96	513.4
Total				0.20	7.35	0.22	0.21	3.68	0.96	513.4

CO2	**CH4**	**N2O**
(g/kWh)	**(g/kWh)**	**(g/kWh)**
690	0.09	0.02

CO2	**CH4**	**N2O**	
(lb/hr)	**(lb/hr)**	**(lb/hr)**	
476	0.062	0.014	Ferry

Continued…

ATTACHMENT 2

SUMMARY OF MAXIMUM MOVES EMISSIONS FACTORS

NOx Max EF

Vehicle type	52	53	61	62
Spd Bin				
1	20.477	20.477	11.195	11.252
2	9.775	9.775	6.106	6.147
3	5.650	5.650	3.624	3.672
4	4.391	4.391	3.010	3.070
5	3.632	3.632	2.563	2.613
6	3.146	3.146	2.295	2.345
7	2.966	2.966	2.183	2.233
8	2.620	2.620	1.885	1.923
9	2.452	2.452	1.804	1.835
10	2.312	2.312	1.742	1.769
11	2.184	2.184	1.667	1.683
12	2.079	2.079	1.601	1.608
13	1.934	1.934	1.623	1.635
14	1.931	1.931	1.684	1.686
15	1.936	1.936	1.737	1.731
16	1.987	1.987	1.815	1.798

PM2.5 Max EF

Vehicle type		52	53	61	62
Spd Bin					
	1	0.325	0.325	0.193	0.194
	2	0.159	0.159	0.102	0.103
	3	0.090	0.090	0.063	0.064
	4	0.069	0.069	0.055	0.057
	5	0.058	0.058	0.050	0.051
	6	0.050	0.050	0.045	0.047
	7	0.048	0.048	0.043	0.044
	8	0.042	0.042	0.034	0.035
	9	0.040	0.040	0.032	0.033
	10	0.038	0.038	0.030	0.031
	11	0.037	0.037	0.028	0.028
	12	0.035	0.035	0.025	0.025
	13	0.032	0.032	0.023	0.024
	14	0.031	0.031	0.023	0.023
	15	0.029	0.029	0.023	0.023
	16	0.029	0.029	0.024	0.024
		0.069			

PM10 Max EF

Vehicle type		52	53	61	62
Spd Bin					
	1	0.354	0.354	0.209	0.211
	2	0.172	0.172	0.111	0.112
	3	0.098	0.098	0.068	0.069
	4	0.075	0.075	0.060	0.062
	5	0.063	0.063	0.054	0.055
	6	0.055	0.055	0.049	0.051
	7	0.052	0.052	0.047	0.048
	8	0.046	0.046	0.037	0.038
	9	0.043	0.043	0.035	0.036
	10	0.042	0.042	0.033	0.034
	11	0.040	0.040	0.030	0.030
	12	0.038	0.038	0.027	0.027
	13	0.035	0.035	0.025	0.026
	14	0.033	0.033	0.025	0.025
	15	0.032	0.032	0.025	0.025
	16	0.031	0.031	0.026	0.026

VOC Max EF

Vehicle type	52	53	61	62
Spd Bin				
1	2.161	2.161	1.174	1.188
2	1.149	1.149	0.673	0.681
3	0.610	0.610	0.366	0.372
4	0.441	0.441	0.262	0.268
5	0.351	0.351	0.206	0.210
6	0.289	0.289	0.179	0.184
7	0.253	0.253	0.159	0.164
8	0.230	0.230	0.140	0.143
9	0.209	0.209	0.129	0.132
10	0.192	0.192	0.120	0.123
11	0.178	0.178	0.112	0.115
12	0.165	0.165	0.105	0.107
13	0.153	0.153	0.101	0.103
14	0.144	0.144	0.098	0.101
15	0.137	0.137	0.097	0.099
16	0.132	0.132	0.097	0.099

CO Max EF

Vehicle type		52	53	61	62
Spd Bin					
	1	8.895	8.895	4.566	4.579
	2	4.635	4.635	2.540	2.550
	3	2.521	2.521	1.409	1.416
	4	1.940	1.940	1.071	1.079
	5	1.648	1.648	0.926	0.931
	6	1.463	1.463	0.827	0.831
	7	1.326	1.326	0.744	0.746
	8	1.213	1.213	0.679	0.679
	9	1.152	1.152	0.632	0.632
	10	1.101	1.101	0.596	0.594
	11	1.045	1.045	0.567	0.565
	12	0.999	0.999	0.542	0.540
	13	0.928	0.928	0.515	0.513
	14	0.872	0.872	0.477	0.476
	15	0.824	0.824	0.445	0.444
	16	0.784	0.784	0.416	0.415

SO2 Max EF

Vehicle type	52	53	61	62
Spd Bin				
1	0.197	0.197	0.103	0.104
2	0.097	0.097	0.058	0.058
3	0.056	0.056	0.035	0.036
4	0.045	0.045	0.031	0.032
5	0.038	0.038	0.027	0.028
6	0.034	0.034	0.025	0.026
7	0.032	0.032	0.025	0.025
8	0.028	0.028	0.021	0.021
9	0.027	0.027	0.020	0.021
10	0.025	0.025	0.020	0.020
11	0.024	0.024	0.019	0.019
12	0.023	0.023	0.018	0.018
13	0.021	0.021	0.019	0.019
14	0.021	0.021	0.020	0.020
15	0.022	0.022	0.021	0.021
16	0.023	0.023	0.022	0.022

CO2e Max EF

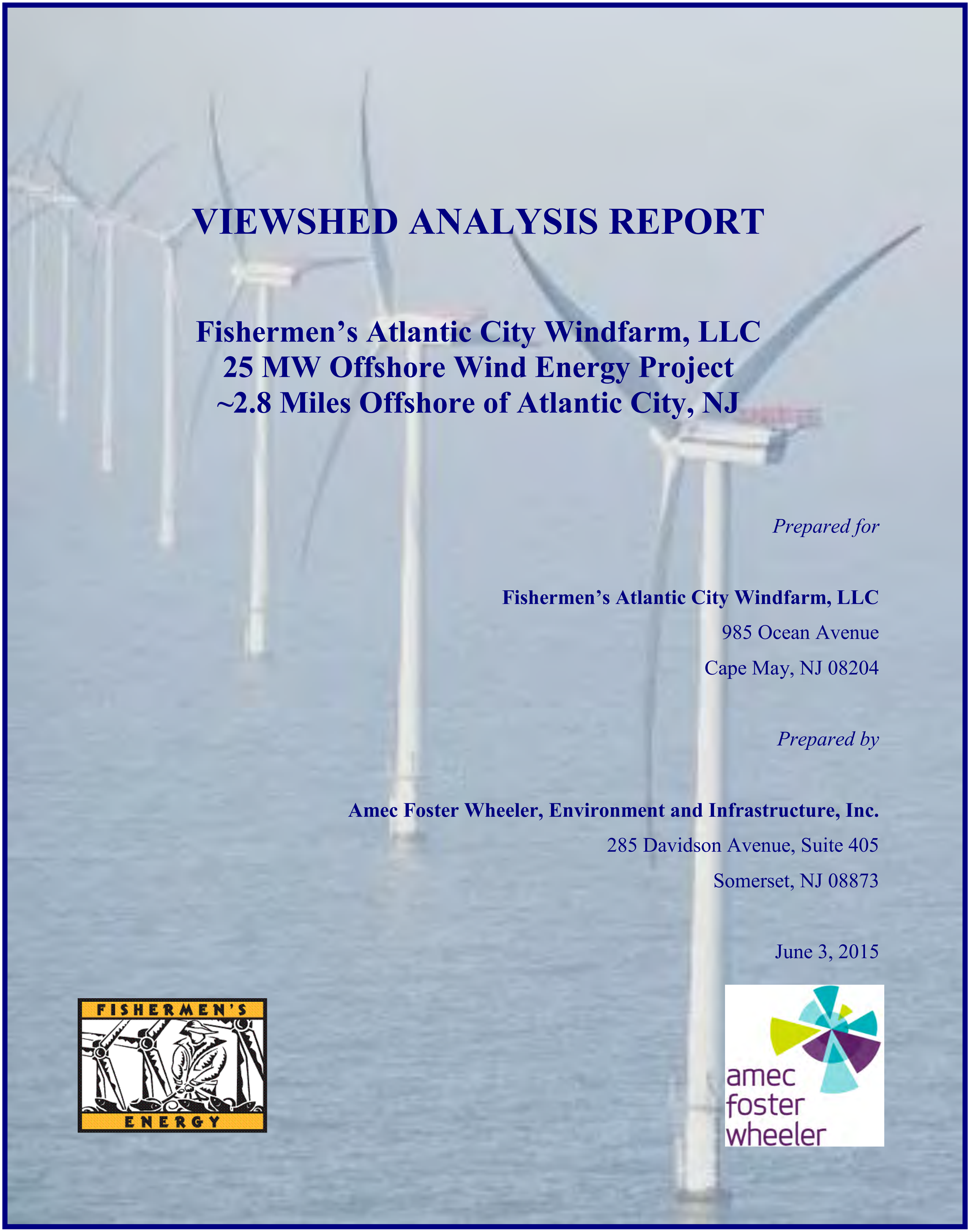
Vehicle type	52	53	61	62
Spd Bin				
1	32933.640	32933.640	17244.740	17346.500
2	16247.070	16247.070	9661.490	9735.440
3	9440.080	9440.080	5921.910	6027.250
4	7456.690	7456.690	5214.370	5345.940
5	6358.940	6358.940	4552.810	4656.850
6	5624.700	5624.700	4216.590	4335.570
7	5397.110	5397.110	4109.630	4228.800
8	4744.490	4744.490	3464.190	3550.530
9	4486.260	4486.260	3380.480	3457.180
10	4259.330	4259.330	3316.310	3388.160
11	4009.498	4009.498	3185.080	3231.310
12	3796.091	3796.091	3048.760	3073.110
13	3521.020	3521.020	3103.100	3136.480
14	3569.577	3569.577	3279.550	3292.990
15	3629.120	3629.120	3430.690	3427.270
16	3786.919	3786.919	3644.320	3616.520
Average	**6267.890**			

APPENDIX H

VIEWSHED ANALYSIS REPORT

(Revised)

June 8, 2015



VIEWSHED ANALYSIS REPORT

Fishermen’s Atlantic City Windfarm, LLC
25 MW Offshore Wind Energy Project
~2.8 Miles Offshore of Atlantic City, NJ

Prepared for

Fishermen’s Atlantic City Windfarm, LLC
985 Ocean Avenue
Cape May, NJ 08204

Prepared by

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285 Davidson Avenue, Suite 405
Somerset, NJ 08873

June 3, 2015

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1.0 INTRODUCTION

This *Viewshed Analysis Report* has been prepared by Amec Foster Wheeler, Environment and Infrastructure, Inc. (Amec Foster Wheeler) on behalf of Fishermen's Atlantic City Windfarm, LLC (Fishermens). This report summarizes the results of a viewshed analysis whose purpose was to determine if a nominal 25 megawatt (MW) offshore wind renewable energy facility (the "Project") within New Jersey (NJ) State waters would visually impair the viewshed from existing historic resources in the vicinity of the project (**Figure 1**).

Photographs were taken from various historic locations within Atlantic County NJ from Atlantic City down to Longport. Viewpoint simulations of the precise location and size of the turbines were placed over those photographs in which at least one turbine would be seen, if constructed (Vissering 2011). The results of this analysis show that, even from historically sensitive areas, the sight of the turbines approximately 2.8 miles offshore does not have a significant effect on the overall Atlantic County viewscape.

It should be noted that the site assessment methodologies and visual simulations presented in this report follow precedence set by previous offshore wind energy visual impact assessment studies. The most relevant precedent to the current study is the Cape Wind Energy Project, proposed for construction off the Massachusetts shore. The Cape Wind project has gone through extensive environmental reviews by the State of Massachusetts, the U.S. Army Corps of Engineers (USACE), the Bureau of Ocean Energy Management (BOEM), and other state and federal agencies (PAL 2004, PAL 2006, Cape Wind Associates LLC 2012, Environmental Design & Research 2006, BOEM 2012). Additional examples include those conducted by John Milner Associates in 2012 for the evaluation of visual impact on cultural resources/historic properties in the North Atlantic, Mid-Atlantic, South Atlantic, and Florida Straits (John Milner Associates 2012). Finally, the Scottish National Heritage along with the Department of Trade and Industry (DTI), co-sponsored a study of offshore windfarms and their effects on local culture resources (DTI 2006). The result was an essential document that provided extensive guidance for assessing the visual impacts of windfarms and how to mitigate any adverse effects.

2.0 PROJECT DESCRIPTION AND SETTING

The following sections present an overview of the proposed Project and a general description of the geographic location and existing visual setting surrounding the Project site.

2.1 PROJECT DESCRIPTION

The reference design for this Project is the construction and operation of six Siemens turbines, oriented in one row (Siemens Wind Power 2008) (**Figure 1; Appendix A**). The Proposed Project consists of the construction, operation, maintenance, and eventual decommissioning of nominal 25 MW offshore wind renewable energy facility, consisting of up to six turbines, a 33-kiloVolt (kV) alternating current (AC) submarine cable interconnecting the turbines (inter-array cable), a 33-kV AC submarine transmission cable (export cable), and a 33-kV AC underground cable (onshore interconnection cable) that would connect the Proposed Project with existing onshore infrastructure located in Atlantic City, New Jersey (**Figure 1**). Interconnection with the existing onshore infrastructure would require onshore switchboxes and minor electrical components.

The offshore components of the Proposed Project, including the turbines and the inter-array cable, would be located in state waters approximately 2.8 nautical miles from Atlantic City, New Jersey. The export cable would traverse state waters to shore. (**Figure 1**). The total ocean area considered as the project area is approximately 170 acres (calculated as the perimeter around the group of six turbines, approximately 200 feet in each direction) plus a 5 foot width along the length of the export cable route from the turbines to the shore); however the actual portion of the area that would be physically disturbed by the placement of the turbines and cables is approximately 2 acres. The cable and turbines would be located in water depths of 26 to 40 feet below mean lower low water (MLLW).

Engineering design of the structures requires that all components are able to withstand environmental conditions experienced during a 100-year return interval storm event. Based on historical studies of site conditions and a MetOcean Solutions Ltd report developed specifically for this project area, the 100 year storm conditions present maximum wind speeds of 112 miles per hour (mph) and maximum wave heights of 37 feet.

The offshore turbine assemblies would each be composed of three primary elements, a foundation, tower, and three blade turbine. **Appendix A** contains an additional depiction of the turbine design. Dimensions and key elevations of the turbine structures are provided below in **Table 2-1**. Each tower would be approximately 16.5 feet in diameter at the base and taper to a diameter of 12.5 feet at the top.

Table 2-1. Dimensions and Key Elevations of the Wind Turbine Structures

Key Elevations	Feet
Piling penetration into seabed	150
Top of foundation	50
Lower blade height	84
Turbine hub height	297
Upper blade height	511
Elevations reference mean low or lower water (MLLW).	

The turbine foundation would be a jacket-type design, consisting of steel pipe piles for anchoring into the seabed, and a steel center caisson onto which the tower would be installed. The pilings would extend approximately 150 feet into the seabed with the top of the foundation extending approximately 50 feet above MLLW. The wind turbines would be comprised of the generator and hub which are enclosed within the turbine nacelle, and the turbine blades. The nacelle houses the major mechanical components of each turbine.

2.2 TURBINE LOCATION AND VISUAL SETTING

The turbines would be located within State waters, approximately 2.8 miles off the coast of Atlantic City (**Figure 2**). The proposed turbine locations were selected to maximize wind energy potential while minimizing visual impacts. The turbines will be oriented parallel to the shore to create a uniform appearance, while still remaining within State waters. **Table 2-2** below presents the latitude and longitude of the proposed six turbine locations in various units.

Table 2-2
Latitude and Longitude of Major Project Components

Turbine Number/Cable location	Latitude (NAD83) (N)	Longitude (NAD83) (W)	NJ State Plane (ft) (X)	NJ State Plane (ft) (Y)	UTM Zone 18 (X)	UTM Zone 18 (Y)
1	39.2999	-74.4369	509979.27	169929.48	549070	4350509
2	39.3048	-74.4260	513053.18	171713.54	549887	4351013
3	39.3099	-74.4154	516054.26	173590.33	550709	4351518
4	39.3150	-74.4047	519078.95	175427.07	551528	4352023
5	39.3198	-74.3939	522148.68	177193.85	552345	4352526
6	39.3250	-74.3832	525152.27	179097.02	553161	4353029
Waterward extent of submarine cable	39.3250	-74.3832	525152.27	179097.02	553161	4353029

Per Coastal Zone Management Rules (N.J.A.C. 7:7E-8.12), scenic resources include the views of the natural and/or built landscape. Large-scale elements of building and site design are defined as the elements that compose the developed landscape such as size, geometry, massing, height, and bulk structures. New coastal development that is visually compatible with its surroundings in terms of building and site design, and enhances scenic resources is encouraged. New coastal development that is not visually compatible with existing scenic resources in terms of large-scale elements of building and site design is discouraged.

The existing visual and aesthetic conditions in the Project area consists of open water punctuated by fishing and other vessels of various sizes. The waters off southern New Jersey are active vessel traffic areas, and the Atlantic City port serves as a hub for a large fleet of both fishing vessels and pleasure craft. The view of the turbines from the shoreline will be unobstructed, with the exception of the occasional passing vessel.

Atlantic City and Ocean City (just south of Atlantic City) are located on barrier beach islands separated from the mainland by estuarine wetlands. The cities are both densely developed, with some tall buildings. Most of the barrier beach between them (including Chelsea Heights, Ventnor City, Margate City, and Longport), and beyond them to the north (Brigantine) and south (Strathmere), are also developed. This developed barrier beach effectively blocks most views of the ocean from further inland in the vicinity of the Project.

3.0 AREA OF POTENTIAL EFFECT AND VIEWSHED SITE SELECTION

3.1 AREA OF POTENTIAL EFFECT (APE)

As defined in the Advisory Council on Historic Preservation regulations (36 CFR 800.16d), the Area of Potential Effect (APE) for a project is the area or areas within which an undertaking may directly, indirectly, or cumulatively cause changes to the character or use of historic properties, if any such properties exist in that location. This visual impact assessment report presents the analysis and findings of visual effect to land-based, aboveground historic resources that may be caused by the development of offshore wind turbines. Determining the limits of the APE is not a straightforward process. The theoretical limit of the APE is the viewshed associated with the structure(s) constructed offshore. It should be noted that in practice, the ability of the human eye to detect (as opposed to recognize) the presence of a structure is considerably less than the theoretical viewshed limit. The methodology used to determine the boundary of the APE for this study followed those used for similar projects, most notably the Cape Wind Energy Project, which used an arbitrary buffer located approximately 300 ft from the Massachusetts shore (PAL 2004, PAL 2006, Cape Wind Associates LLC 2012, Environmental Design & Research 2006, BOEM 2012).

The APE includes all of the area between the Boardwalk/Shoreline on the South, 11th Avenue on the West, and New Hampshire Avenue on the East. The northern boundary includes the eastern end of Pacific Avenue, then extends along the western end of Atlantic Avenue following the merger of two throughways (**Figure 3 - Figure 6**). The northern boundary of the APE was established based on the density of structures along Pacific Avenue and Atlantic Avenue which creates a complete visual barrier of the horizon from the city center. The remaining boundaries on the south, east and west were established by the edge of the shoreline itself. The area surrounding the APE is a dense urban core that has seen continual development and change since the early twentieth century. High-rise hotels, casinos, and other commercial enterprises dominate the skyline, taking advantage of the ideal setting of the New Jersey coastline.

3.2 VIEWSHED SITE SELECTION

The sites selected for visual impacts evaluation included those properties that are listed on the National Register of Historic Places (NRHP) following precedence set by previous offshore wind energy visual impact assessment studies. The most relevant precedent to the current study is the Cape Wind Energy Project, proposed for construction off the Massachusetts shore. The Cape Wind project has gone through extensive environmental reviews by the State of Massachusetts, the U.S. Army Corps of Engineers (USACE), and the BOEM (PAL 2004, PAL 2006, Cape Wind Associates LLC 2012, Environmental Design & Research 2006, BOEM 2012). Additional examples include those conducted by John Milner Associates in 2012 for the evaluation of visual impact on cultural resources/historic properties in the North Atlantic, Mid-Atlantic, South Atlantic, and Florida Straits (John Milner Associates 2012). The APE, identification, and evaluation methodologies used within this report, as well as for other offshore visual impact studies, were developed by the USACE in consultation with the Advisory Council on Historic Preservation (ACHP), BOEM, as well as various State Historic Preservation Offices (SHPO) (PAL 2004, PAL 2006, Cape Wind Associates LLC 2012, Environmental Design & Research 2006, BOEM 2012, John Milner Associates 2012).

Amec Foster Wheeler visited the NJ SHPO on January 26, 2010 in order to develop a list of sites that are present on the National and/or State Register of Historic Places from Brigantine, NJ down to Longport, NJ. National and/or State Register of Historic Places that could potentially be effected by the construction of the turbines were selected based on the established APE. The original list of sites included the following:

1. Church of the Redeemer – Longport, NJ (National and State registered)
2. Great Egg Coast Guard Station – Longport, NJ (National and State registered)
3. Lucy the Margate Elephant – Margate City, NJ (National and State registered)
4. John Stafford Historic District – Ventnor City, NJ (National and State registered)
5. Raphael-Gordon House – Atlantic City, NJ (State registered)

6. The Strand and Marine Apartments – Atlantic City, NJ (State registered)
7. Atlantic City Convention Hall – Atlantic City, NJ (National and State registered)
8. Warner Theater (façade) – Atlantic City, New Jersey (State registered)
9. Shelburne Hotel – Atlantic City, New Jersey (National and State registered)
10. Holmhurst Hotel – Atlantic City, NJ (National and State registered)
11. Morton Hotel – Atlantic City, NJ (National and State registered)
12. Absecon Lighthouse – Atlantic City, NJ (National and State registered)

Upon further research into the individual sites within the defined APE, it was discovered that the three hotels in Atlantic City (Shelburne Hotel, Holmhurst Hotel, and Morton Hotel) have all been demolished and are no longer in existence. The Holmhurst Hotel was demolished in March 1985 (**Appendix B**). No dates of demolition were available for the other two buildings. Based upon the above information, the field evaluation was limited to the nine places still in existence from the list (**Figure 5**).

4.0 VIEWSHED SITE EVALUATIONS

On March 9 and 19, 2010, Amec Foster Wheeler visited the nine selected locations based on the SHPO review. At each location, the closest and/or highest vantage point was selected to take photographs facing the direction in which the turbines will be located. At least two or three photos were taken towards the ocean in order to fully cover the entire viewscape in the direction of the turbines. Following the fieldwork, it was determined that the following places were the only ones from the list in which the turbines would be visible:

1. The John Stafford Historic District,
2. The Raphael-Gordon House,
3. The Strand and Marine Apartments,
4. The Atlantic City Convention Hall,
5. The Warner Theater (façade),
6. The Absecon Lighthouse; and
7. Lucy the Margate Elephant.

4.1 VIEWPOINT SIMULATION PHOTOGRAPH METHODOLOGY

In consultation with the NJ SHPO conducted on May 1, 2015, it was determined two types of viewpoint photo simulations would be included as part of the current study to better understand the visual impacts that the addition of wind turbines would have on NRHP listed properties within the established APE. The first perspective for the Fisherman's Energy Windfarm report would include the simulated viewpoint from the highest point atop of the selected historic properties within the APE out towards the proposed locations of the turbines, while the second visual perspective would be from the viewpoint of the turbines looking back at the Atlantic City shoreline towards the National and/or State Register of Historic Places sites listed in this report. The following section describes the mathematical and computer process that was used to create these two viewpoint simulations.

The Viewpoint photo simulations from the perspective of the National and/or State Register of Historic Places properties were generated using 3D Studio Max and are based partially on Clean Energy States Alliance's model discussed in *A Visual Impact Assessment Process for Wind Energy Projects* (Vissering 2011). Similar processes and viewpoint photo simulations can be found in other off shore windfarm reports such as those for the Cape Wind Energy Project Visual Impact Assessment in Nantucket Sound (PAL 2004, PAL 2006). Camera locations, photo properties, wind turbine geometry, and lighting were modeled as follows.

1. Photography from viewpoints – The photos were taken with a Canon Powershot SD1100 digital camera using digital equivalent focal length setting of approximately 50mm for all the photos, which is the max limit to which the human eye can determine. The photographer recorded the location of the photo on an aerial photo along with the view direction and camera height. These metrics were also imbedded in the photo's metadata automatically by the Canon Powershot.
2. Photo parameters – Camera settings including focal length, exposure, and time of day are automatically recorded as EXIF (Exchangeable image file format) data embedded in the digital image file. The EXIF data was used to calculate the field of view of the image using the EXIFtool software in order to create a virtual camera in 3D Studio Max. The calculated field of view was 49.5 degrees, which mimics the limits of the human eye.
3. Camera locations – The exact camera locations and directions recorded in the metadata of the photos were modeled in 3D Studio Max by using the ortho photo locations and DEM elevation data. Camera directions were determined from the field notes and by referencing landmarks in the photo with the aerial photos.
4. Wind Turbine models – The make and model of the proposed wind turbines was based on a Siemens model SWT-3.6 120 scaled to a hub height of 296' and a blade swept diameter of 375' with a maximum height of 483.5'. This model would simulate the shape and size of a similar turbine used for this proposed project. The wind turbines were placed at coordinates provided by the client. The maximum visible height would vary from two to five feet lower from the viewpoints due to curvature of the earth (approximately eight inches per mile). The turbines models were colored light

grey (RGB 234,234,234) with a semi-gloss finish similar to what will be used for this project.

5. Lighting – The sunlight direction was modeled using the 3D Studio Max Daylight system utility based on the geographic location and time of day recorded with the photo.
6. Photo rendering – The final photo image was created by rendering the turbine models from each camera locations with a transparent background. These images were merged with the photos using the Photoshop software. The turbine images were edited to blend in object in the foreground that would partially or fully obstruct a tower.

For more information regarding the process involved with the creation of the visual simulation photographs depicted in this report please see Jean Vissering's *A Visual Impact Assessment Process for Wind Energy Projects,* produced by Clean Energy States Alliance.

To represent the view of the New Jersey, Atlantic City shoreline from the perspective of the wind turbines Amec Foster Wheeler used a 3D modeling methodology. The 3D model is processed through Google Earth Pro. The representation is produced inside of Google Earth and framed and scaled inside of ArcGIS, using the following process:

1. Enter the coordinate of the potential turbine
2. Navigate to the location of the turbine
3. Represent the view from an eye altitude of 295 ft.
4. Produce an oblique aerial view of the structures on the shoreline.

4.2 THE JOHN STAFFORD HISTORIC DISTRICT

The John Stafford Historic District is comprised of four city blocks along the eastern border of Ventnor City, NJ (**Figure 5**). The streets contained within this district include South Austin Avenue, South Marion Avenue, South Baton Rouge Avenue, and South Vassar Square.

View of S. Baton Rouge Avenue – facing northwest

Although this area is listed as a National and State Historic District, there were no obvious signs along the boardwalk declaring it as such. In addition, the houses within the district appeared to be older homes mixed in with more recent and modern construction. The optimal vantage point of the ocean within this district is from the boardwalk lining the southeast border due to the density of structures which tend to block sightlines to the shore. It is from the boardwalk at the end of each of the four streets in which the field photographs were taken. For more information regarding the history of this site, see **Appendix C**.

4. 3 THE RAPHAEL-GORDON HOUSE

Raphael-Gordon House is located at 118 South Newton Street, just within the western border of Atlantic City, NJ (**Figure 5**). It is nestled within a residential area with no obvious signage from the street.

View of the Raphael-Gordon House – facing west

The property is privately owned by the Raphel and Gordon Families. It is not open to the public; however, one of the owners, Murry Raphel, will invite people in for tours if they are interested.

The vantage point of the ocean was from the second story balcony in the southeast corner of the house. It is from these two locations in which the field photographs were taken. For more information regarding the history of this site, see **Appendix C**.

4. 4 THE STRAND AND MARINE APARTMENTS

The former Strand and Marine Apartments complex buildings are located at 3821- 3825 Boardwalk Avenue in Atlantic City, NJ (**Figure 5**). The buildings are currently vacant and boarded up. In addition, a "for sale" sign is hanging in front of one of them.

View of the Strand and Marine Apartments – facing north

Vantage points of the ocean that was accessible to the public was from the boardwalk adjacent to the southeast sides of the buildings. It is from this location in which the field photographs were taken. For more information regarding the history of this site, see **Appendix C.**

4.5 THE ATLANTIC CITY CONVENTION HALL

The Atlantic City Convention Hall is located at 2301 Boardwalk, Atlantic City, NJ (Charleton 1985) (**Figure 5**). The building is no longer being used as a convention hall. It is currently named "Atlantic City Boardwalk Hall" and is the home to various sporting and concert events.

View of the Atlantic City Convention Hall – facing northwest

According to their website (www.boardwalkhall.com), approximately 33 million people visit the arena each year, the majority of whom are assumed to be visiting specifically for the entertainment held within the building. Vantage point of the ocean that was accessible to the public without a ticket to an event was from the open air stage adjacent to the southeast side of the building. It is from this location in which the field photographs were taken. For more information regarding the history of this site, see **Appendix C.**

4.6 THE WARNER THEATER (FAÇADE)

The Warner Theater façade is located along the boardwalk, between Michigan and Arkansas Avenues, Atlantic City, NJ (**Figure 5**). The outer façade, which used to be the original entrance, is the only existing portion of the former theater. The much larger auditorium was demolished in 1960 (**Appendix C**).

View of the Warner Theater (façade) – facing northwest

The façade now is part of the Bally's Wild West Casino (John Milner Associates 1996). The ocean was visible from the boardwalk in front of the site. It is from this location in which the field photographs were taken. For more information regarding the history of this site, see **Appendix C.**

4.7 THE ABSECON LIGHTHOUSE

The Absecon Lighthouse is located at 31 South Rhode Island Avenue, Atlantic City, NJ (Wilson 1970). It was chosen due to the fact that the observation deck is available to the public which provides a birds-eye view of the surrounding area.

View of the Absecon Lighthouse – facing southwest

According to their staff, approximately 20,000 people visited the lighthouse last year. They also stated that tourism to the lighthouse has been increasing each year and has nearly doubled in the last five years. The best vantage point of the ocean was from the observation deck over 160 feet in the air along the southern and southeastern sides of the tower. It is from this location in which the field photographs were taken. For more information regarding the history of this site, see **Appendix C.**

4.8 LUCY THE MARGATE ELEPHANT

Lucy the Margate Elephant is located at 9200 Atlantic Avenue in Margate City, approximately two miles west of Atlantic City. Standing six stories high, Lucy is an excellent example of novelty architecture, constructed of wood and tin sheeting in 1881 by James V. Lafferty. In that same year, the U.S. Patent Office granted Lafferty a patent giving him the exclusive right to make, use or sell animal-shaped buildings for 17 years. A Historic American Buildings Survey (HABS No. NJ-816) documentation of Lucy was conducted by Liz Jandoli and Virginia Price in the mid 1930s. Lucy was listed on the National Park Registry of Historical Landmarks on May 11, 1976 (Pitts 1971). Located right on the beach in Josephine Harron Park, the ocean horizon was visible from the top of Lucy's howdah, the canopied platform atop the elephant's back. It is from this location in which the field photographs were taken. For more information regarding the history of this site, see **Appendix C.**

View of the Lucy the Margate Elephant – facing north

5.0 VIEWSHED RESULTS

The following sections summarize the results of the turbine overlays from each of the historical sites in which the turbines would be visible.

5.1 THE JOHN STAFFORD HISTORIC DISTRICT

The viewscape from the boardwalk at the end of all the streets associated with the John Stafford Historic District includes various structures typically seen along the NJ shore. High dunes and dune fencing, boardwalk associated railings and signs, lifeguard stations, and light poles are all visible from within the district and serve to disrupt sightlines to a number of the proposed turbines from historic properties (**Appendix D, photos 1, 3, 5, 7, 9, 11, 13, and 15**). As illustrated by the visual simulation photographs found in **Appendix D**, the view from the historic district is obscured and/or partially obscured by the large dunes, as well as several man-made structures. Essentially the visual simulation photographs demonstrate that the turbines will not be visible from street level within the district, with the only observation points where the turbines would be visible are from the boardwalk just outside the district boundary. Moreover, while the turbines will be visible from the boardwalk at the end of each street, the perceived size of the turbines 2.8 miles off the coast will not disrupt the visual horizon to a large enough degree to be readily distinguishable to the naked eye. (**Appendix D, photos 2, 4, 6, 8, 10, 12, 14, and 16**). Based on these findings, the proposed turbines will not significantly change the historic setting, association, feel, or view of the John Stafford Historic District as a whole.

5.2 THE RAPHAEL-GORDON HOUSE

The viewscape from the second story balcony of the Raphael-Gordon House (which is only accessible to the public upon a request to the owner) includes portions of another two-story building nearby and a large evergreen tree to the east that were found to obscure and/or partially obscure sightlines to a number of the proposed turbines from the historic property (**Appendix D, photo 17**). Only two turbines will be visible from the balcony; however, the perceived size of the turbines located 2.8 miles off the coast, along with spacing in which the turbines will be located significantly impedes the visual awareness of the windfarm structures from the Raphael-Gordon House (**Appendix D, photo 18**). The viewscape from the street level at the Raphael-Gordon House includes portions of another two-story building nearby, large evergreen tree trunks, high dunes, a light pole, and the adjacent roadway (**Appendix D, photo 19**). Although four turbines will be visible from the street, the view of two of them is almost entirely blocked by the high dunes (**Appendix D, photo 20**). Based on these findings, the proposed turbines will not significantly change the historic setting, association, feel, or view of the Raphael-Gordon House.

5.3 THE STRAND AND MARINE APARTMENTS

The viewscape from the boardwalk in front of the former Strand and Marine Apartment complex includes various structures typically seen along the NJ shore. High dunes and dune fencing, boardwalk associated railings, a pavilion, and light poles are all visible and were found to obscure and/or partially obscure sightlines to a number of the proposed turbines from the historic property (**Appendix D, photos 21 and 23**). Although the turbines will be visible from the boardwalk in front of the buildings, the perceived size of the turbines located 2.8 miles off the coast, along with spacing in which the turbines will be located significantly impedes the visual awareness of the windfarm structures from the historic complex (**Appendix D, photos 22 and 24**). Based on these findings, the proposed turbines will not significantly change the historic setting, association, feel, or view of the Strand and Marine Apartment complex.

5.4 THE ATLANTIC CITY CONVENTION HALL

The viewscape from the stage in front of the Atlantic City Convention Hall building includes various pillars associated with the roof of the stage and high dunes typically seen along the NJ shore (**Appendix D, photos 25, 27, and 29**). As the visual simulation photographs found in Appendix D demonstrate, the stage pillars, coupled with the dunes were found to greatly minimize sightlines to a number of the proposed turbines from the Convention Hall. Although the turbines will be visible from the stage, the perceived size of the turbines located 2.8 miles off the coast, along with spacing in which the turbines will be located significantly impedes the visual awareness of the windfarm structures from the Convention Hall (**Appendix D, photos 26, 28, and 30**). Based on these findings, the proposed turbines will not significantly change the historic setting, association, feel, or view of the Atlantic City Convention Hall.

5.5 THE WARNER THEATER (FAÇADE)

The viewscape from the boardwalk in front of the Warner Theater façade includes structures typically seen along the NJ shore. High dunes and dune fencing, boardwalk associated railings and other public structures, a pier with large billboards attached to the side towards the south, light poles, and a life guard station are all visible and were found to obscure and/or partially obscure sightlines to a number of the proposed turbines from Warner Theater façade (**Appendix D, photos 31, 33, and 35**). As the visual simulation photographs illustrate, while the turbines will be visible from the boardwalk in front of the façade, the view of a majority of turbine bases would be completed blocked by the high dunes in that area (**Appendix D, photos 32, 34, and 36**). In addition, the perceived size of the turbines located 2.8 miles off the coast will not disrupt the visual horizon to a large enough degree to be readily distinguishable to the naked eye. In effect, within the perceptible range of the human eye, the distance and spacing in which the turbines will be located significantly impedes the visual awareness of the windfarm structures from the historic façade. Based on these findings, the proposed turbines will not significantly change the historic setting, association, feel, or view of the Warner Theater façade.

5.6 THE ABSECON LIGHTHOUSE

The viewscape from the Absecon Lighthouse public observation deck includes many structures typically seen within Atlantic City, NJ. There are several structures that were found to be previous impacts that are visible from the lighthouse. The most significant of these was the Vermont Plaza Apartments, a high-rise building located on Oriental Avenue, just east of the Absecon Lighthouse. As **Figures 9** through **Figure 11** in **Appendix D** illustrate, the line of sight to the lighthouse from all but Turbine 6, was found to be obscured and/or partially obscured by this apartment building. Other structures include smaller housing units, streets, and parking lots. (**Appendix D, photo 37**). As the visual simulation photographs illustrate only one turbine will be visible from the observation deck of the Absecon Lighthouse; the perceived size of Turbine 6 located 2.8 miles off the coast will not significantly disrupt the visual horizon enough to be readily perceptible by the human eye (**Appendix D, photo 38**). Based on these findings, the proposed turbines will not significantly change the historic setting, association, feel, or view of the Absecon Lighthouse.

5.7 LUCY THE MARGATE ELEPHANT

The viewscape from Lucy the Margate Elephant's howdah includes previous impacts from a few structures that are typical to the beachside location of Josephine Harron Park, in Margate, NJ (**Appendix D, photo 39**). Lucy is directly flanked by rental properties including a small two story housing unit on the northeast and a larger three story condo on the southwest. Two additional beach related structures, a concession stand and pavilion, are located adjacent to Lucy on the southeast. The most significant structure in regards to the viewshed from atop Lucy is the sixteen story condo tower located one block northeast on South Cedar Grove Street. The construction of these multi-story buildings has significantly diminished the historic view of Lucy. While all six turbines will be visible from the howdah of Lucy; as the visual simulation photographs show, the perceived size of the turbines located 2.8 miles off the coast will not significantly disrupt the visual horizon enough to be readily perceptible by the human eye (**Appendix D, photo 40**). Essentially, this distance, coupled with the proposed spacing of the turbines significantly impedes the visual awareness of the windfarm structures from the mainland (DTI 2006). As recorded in an email dated June 5, 2015, consultations with Richard D. Helfant the Executive Director and CEO of Save Lucy Committee, Inc., the operating body for Lucy the Elephant, concluded that the proposed turbines would not have a negative impact on the viewshed of the historic Lucy structure. Based on these findings, the proposed turbines will not significantly change the historic setting, association, feel, or view of Lucy the Margate Elephant.

6.0 CONCLUSION

The submittal of this document for your review is intended to be in compliance with Section 106 of the National Historic Preservations Act (NHPA). Based on the results of this study, it is unlikely that the project components has the potential to adversely affect any cultural resource listed on the NRHP. The turbines will only be visible from six National and/or State Registered Historic Places between Ventnor City and Atlantic City, NJ.

A number of factors were taken into account when determining the visual effects that the proposed windfarm turbines would have on historic resources in the area. As the visual simulation photographs found in **Appendix D** demonstrate, the proposed turbines located approximately 2.8 miles off shore will not disrupt the visual horizon to a large enough degree to be decidedly visible by the naked eye when viewed from the NRHP structures. In effect, while individuals may be able to see the turbines when standing on the shore to some degree, they will be barely distinguishable on the horizon. These observations are supported by studies of offshore windfarms by the Scottish National Heritage that determined that within the perceptible range of the human eye, turbines located at this particular distance, combined with the small number of turbines and the spacing between them, significantly impedes the visual awareness of the windfarm structures from the mainland (DTI 2006).

This lack of perception is also aided by the construction of the turbines in off-white to light grey materials, which would greatly minimize their visibility by allowing them to readily blend with the natural skyline and reflecting water (Cape Wind Associates 2012). Moreover, currently existing developments, such as multi-story hotels, condos, casinos, and other commercial enterprises, as well as the natural formations such as the massive sand dunes were found to obscure and/or partially obscure sightlines to a number of the proposed turbines from historic properties. These conditions all contribute to minimizing and/or eliminating the magnitude of change that the proposed turbines will have on the setting, association, and feel of the historic properties (DTI 2006). Based on these factors, Amec Foster Wheeler recommends that there will be No Adverse Visual Effect to the historic properties described within this report. As such, no additional architectural work is recommended for this project.

While not associated with the Viewshed Analysis, it is important to note that a public survey conducted by the William J. Hughes Center for Public Policy on behalf of Fisherman's suggested that the potential view of the proposed project was not seen as an issue by the general public (William J. Hughes Center for Public Policy 2009). The executive summary of their report reads as follows:

> *In preparation for a proposed wind turbine project approximately three miles off the Atlantic City, New Jersey shoreline, Fishermen's Energy, LLC, approached the William J. Hughes Center for Public Policy at The Richard Stockton College of New Jersey and asked that we undertake a statistically significant polling project that would measure attitudes and issues of both residents and visitors to the area. The intent was to:*
>
> 1. *Submit a specific project plan to the respondents;*
> 2. *Observe if there would be any substantial positive or negative impact on the area's tourism industry and/or the quality of life for residents;*
> 3. *Contrast where applicable the attitudes measured in a 2006 survey undertaken by the State of New Jersey Department of Commerce and note any changes.*
>
> *Following is a brief summary of the findings:*
>
> - *90% of the respondents were aware that electricity could be produced by using offshore wind turbines*
> - *Support for a wind turbine project three miles off the Atlantic City shore is strong among all subgroups and almost 30 percentage points higher than a similar question asked in 2006*
> - *Most respondents do not feel that this project would have a negative impact on Atlantic City and the local environment. In fact, 66% thought it would have a positive impact.*
> - *More than three-quarters of the visitors said it would have no effect on whether or not they would visit the Atlantic City area and another 19% said that they would be a little or a lot more likely to visit the area.*

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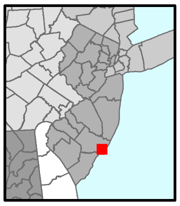
Figures



Legend

— Proposed cable route

● Proposed turbine locations

S Huron substation

DATA SOURCE: United States Geological Survey Quadrangles: Oceanville, New Jersey 1989; Atlantic City, New Jersey 1989

amec Earth & Environmental

Figure 1
Site Location Map
Proposed 20 MW Offshore Wind Project
Offshore of Atlantic County, New Jersey

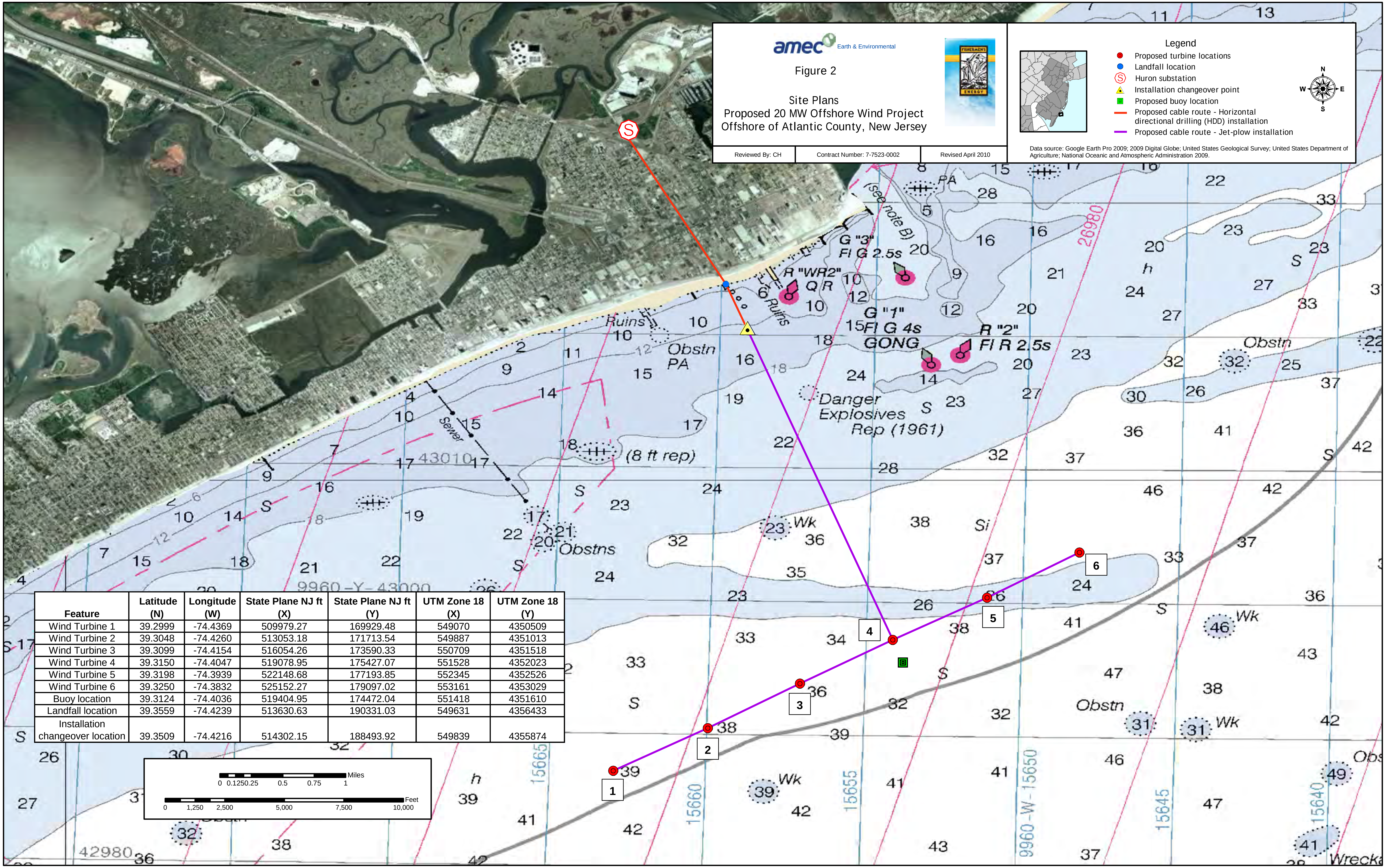
Reviewed By: PP	Contract Number: 7-7523-0002	April 2010

amec Earth & Environmental

Figure 2

Site Plans
Proposed 20 MW Offshore Wind Project
Offshore of Atlantic County, New Jersey

Reviewed By: CH	Contract Number: 7-7523-0002	Revised April 2010

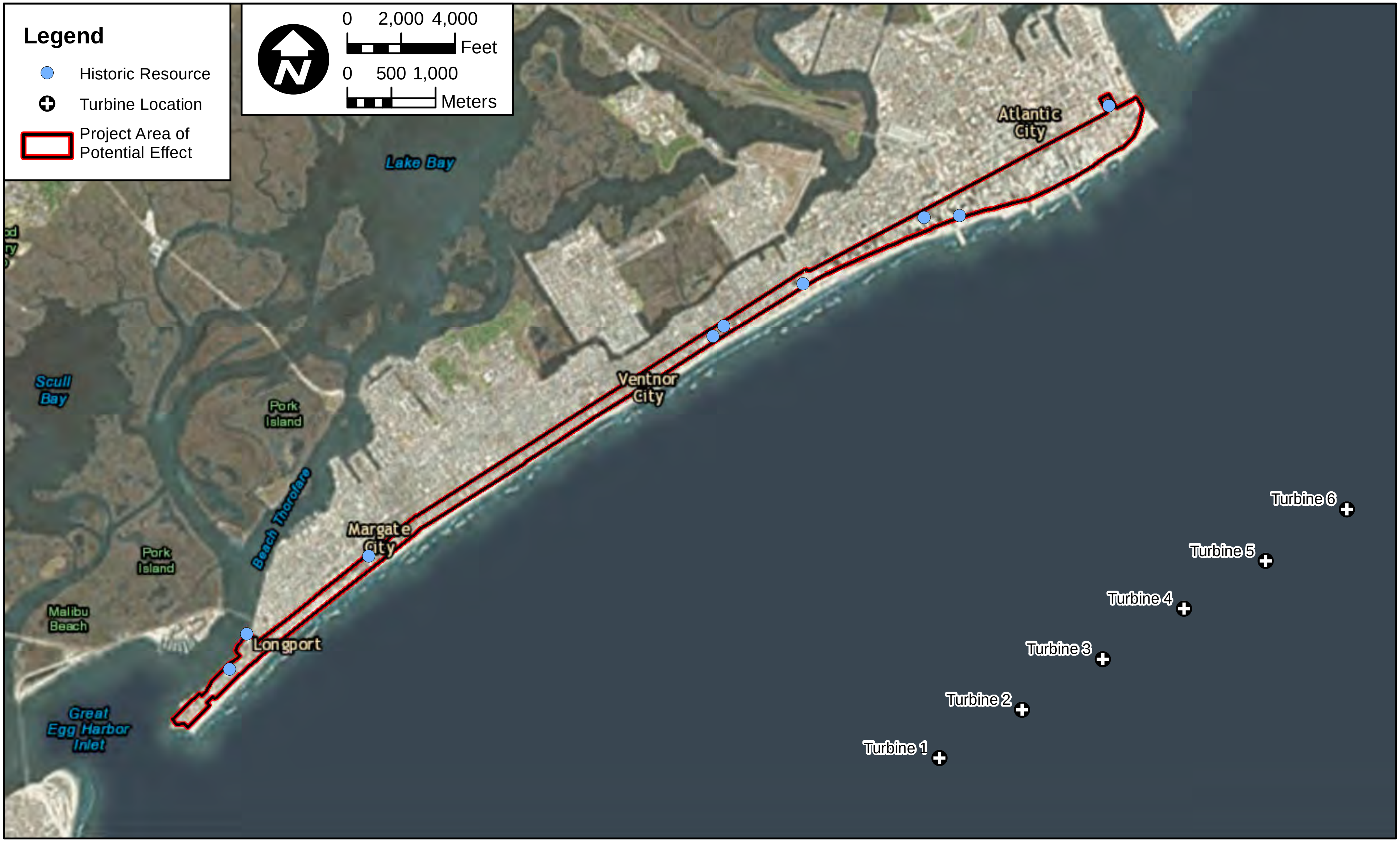


Legend

- ● Proposed turbine locations
- ● Landfall location
- Ⓢ Huron substation
- ▲ Installation changeover point
- 🟩 Proposed buoy location
- — Proposed cable route - Horizontal directional drilling (HDD) installation
- — Proposed cable route - Jet-plow installation

Data source: Google Earth Pro 2009; 2009 Digital Globe; United States Geological Survey; United States Department of Agriculture; National Oceanic and Atmospheric Administration 2009.

Feature	Latitude (N)	Longitude (W)	State Plane NJ ft (X)	State Plane NJ ft (Y)	UTM Zone 18 (X)	UTM Zone 18 (Y)
Wind Turbine 1	39.2999	-74.4369	509979.27	169929.48	549070	4350509
Wind Turbine 2	39.3048	-74.4260	513053.18	171713.54	549887	4351013
Wind Turbine 3	39.3099	-74.4154	516054.26	173590.33	550709	4351518
Wind Turbine 4	39.3150	-74.4047	519078.95	175427.07	551528	4352023
Wind Turbine 5	39.3198	-74.3939	522148.68	177193.85	552345	4352526
Wind Turbine 6	39.3250	-74.3832	525152.27	179097.02	553161	4353029
Buoy location	39.3124	-74.4036	519404.95	174472.04	551418	4351610
Landfall location	39.3559	-74.4239	513630.63	190331.03	549631	4356433
Installation changeover location	39.3509	-74.4216	514302.15	188493.92	549839	4355874



Fishermen's Energy, LLC.

Amec Foster Wheeler
Environment & Infrastructure
690 Commonwealth Center
11003 Bluegrass Parkway
Louisville, KY 40299

amec foster wheeler

MAP BY:
daniel.conn

CHK'D BY:
MEP

DATUM:
North American 1983

PROJECTION:
NAD 1983 UTM Zone 18N

SCALE:
1 inch = 1 miles

PROJECT:

Fishermen's Energy, LLC.
Atlantic City Windfarm

TITLE:

Project Area Overview

TIME:
3:19:26 PM

DATE:
6/2/2015

PROJECT #:
775230003

FIGURE #3:

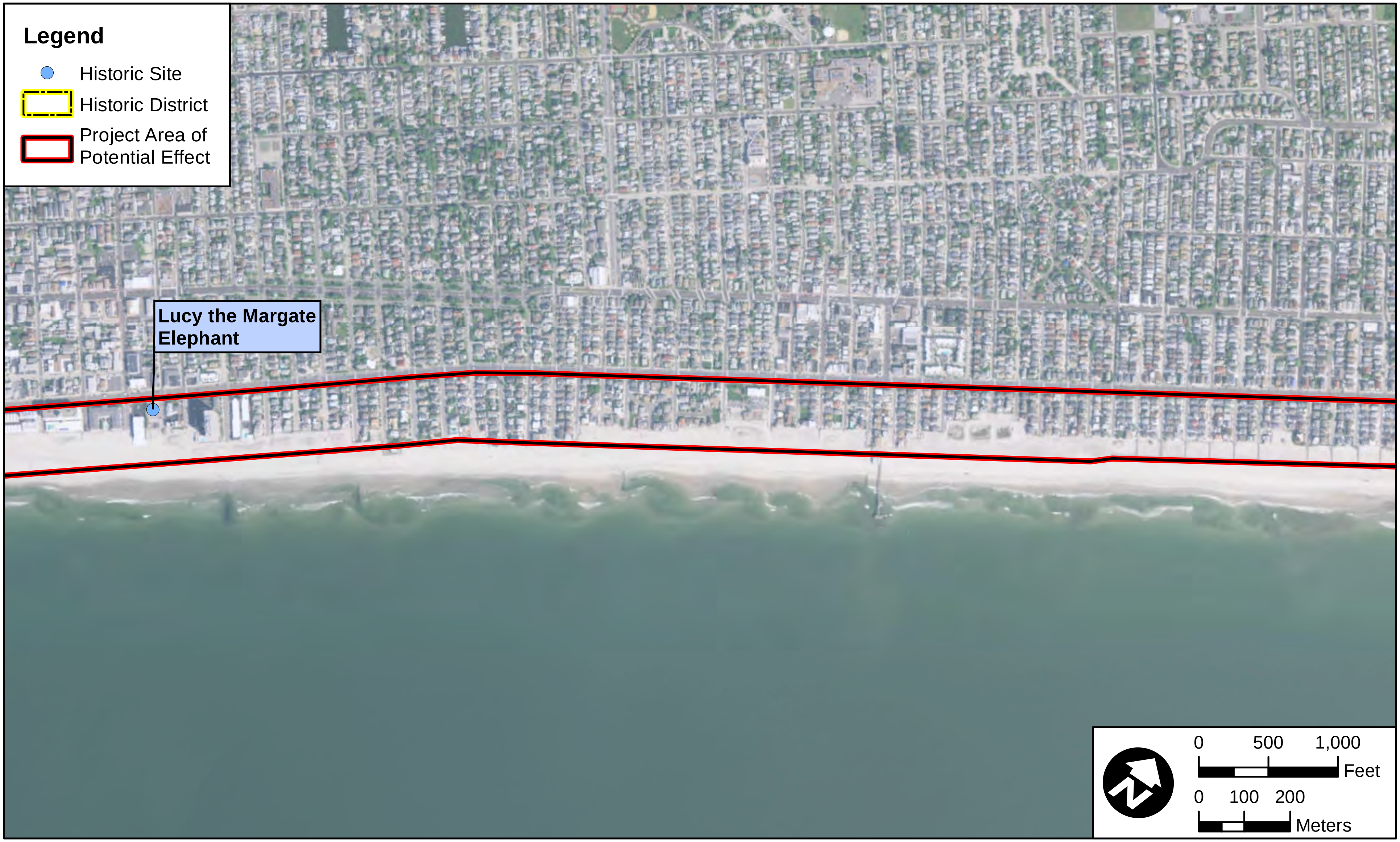
ProjectOverview_85x11

Imagery: ESRI, 2011

Fishermen's Energy, LLC.		MAP BY: daniel.conn	PROJECT:	TITLE:	TIME: 3:45:57 PM
		CHK'D BY: MEP			DATE: 6/2/2015
Amec Foster Wheeler Environment & Infrastructure 690 Commonwealth Center 11003 Bluegrass Parkway Louisville, KY 40299	amec foster wheeler	DATUM: North American 1983	Fishermen's Energy, LLC. Atlantic City Windfarm	Project Area with Previously Identified Historic Site Locations	PROJECT #: 775230003
		PROJECTION: NAD 1983 UTM Zone 18N			FIGURE #4:
		SCALE: 1 inch = 1,000 feet			

U:\Sidework\Matt\Fishermans_Windfarm\ProjectMapbook_85x11.mxd

Imagery: ESRI, 2011



Fishermen's Energy, LLC.

Amec Foster Wheeler
Environment & Infrastructure
690 Commonwealth Center
11003 Bluegrass Parkway
Louisville, KY 40299

amec foster wheeler

MAP BY: daniel.conn

CHK'D BY: MEP

DATUM: North American 1983

PROJECTION: NAD 1983 UTM Zone 18N

SCALE: 1 inch = 1,000 feet

PROJECT:
Fishermen's Energy, LLC.
Atlantic City Windfarm

TITLE:
Project Area with Previously Identified
Historic Site Locations

TIME: 3:45:59 PM

DATE: 6/2/2015

PROJECT #: 775230003

FIGURE #5

U:\Sidework\Matt\Fishermans_Windfarm\ProjectMapbook_85x11.mxd

Imagery: ESRI, 2011

Fishermen's Energy, LLC.

Amec Foster Wheeler
Environment & Infrastructure
690 Commonwealth Center
11003 Bluegrass Parkway
Louisville, KY 40299

amec foster wheeler

MAP BY: daniel.conn

CHK'D BY: MEP

DATUM: North American 1983

PROJECTION: NAD 1983 UTM Zone 18N

SCALE: 1 inch = 1,000 feet

PROJECT:

Fishermen's Energy, LLC.
Atlantic City Windfarm

TITLE:

Project Area with Previously Identified
Historic Site Locations

TIME: 3:46:01 PM

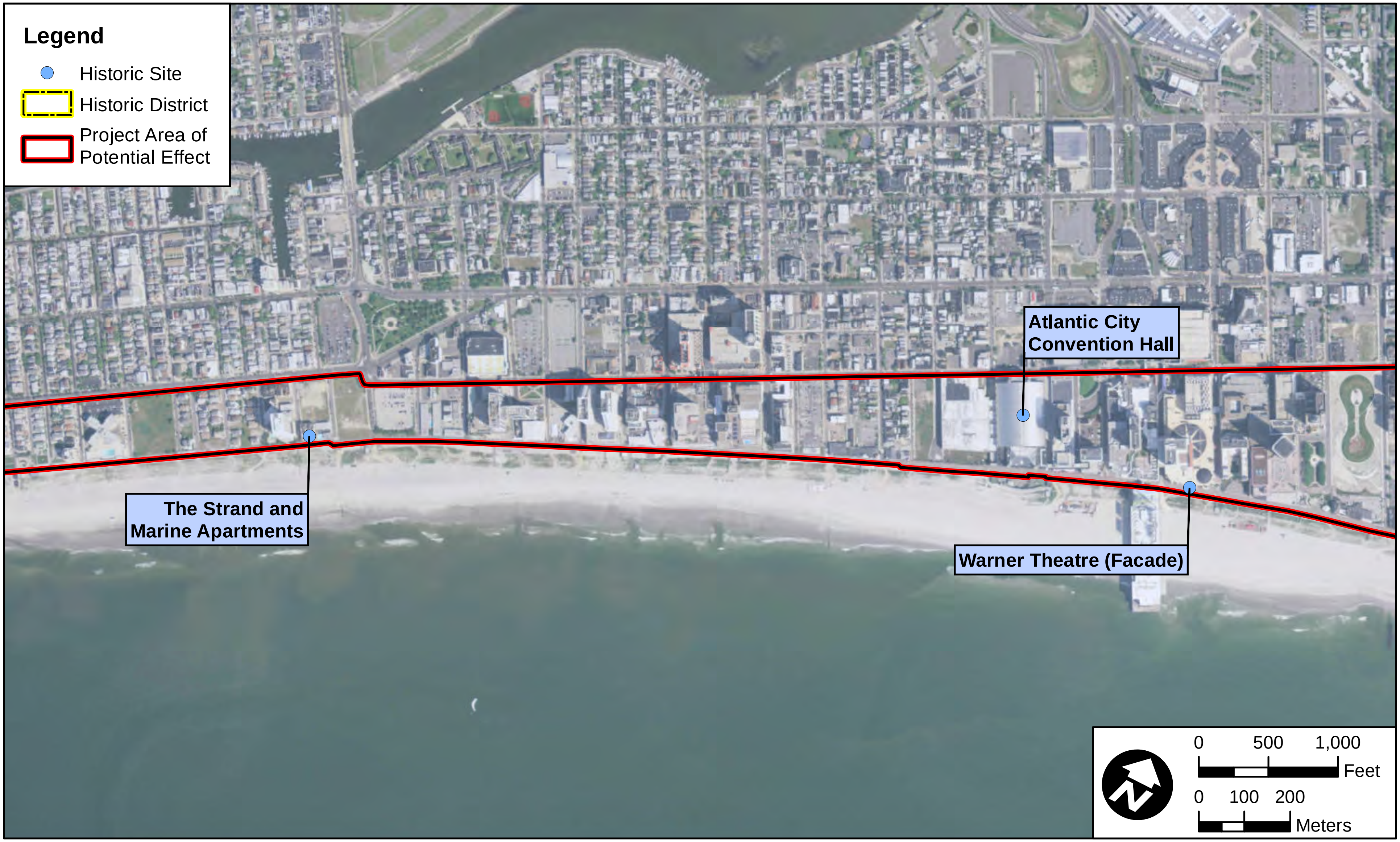
DATE: 6/2/2015

PROJECT #: 775230003

FIGURE #6

U:\Sidework\Matt\Fishermans_Windfarm\ProjectMapbook_85x11.mxd

Imagery: ESRI, 2011



Fishermen's Energy, LLC.

Amec Foster Wheeler
Environment & Infrastructure
690 Commonwealth Center
11003 Bluegrass Parkway
Louisville, KY 40299

amec foster wheeler

MAP BY: daniel.conn

CHK'D BY: MEP

DATUM: North American 1983

PROJECTION: NAD 1983 UTM Zone 18N

SCALE: 1 inch = 1,000 feet

PROJECT:

Fishermen's Energy, LLC.
Atlantic City Windfarm

TITLE:

Project Area with Previously Identified
Historic Site Locations

TIME: 3:46:04 PM

DATE: 6/2/2015

PROJECT #: 775230003

FIGURE #7

U:\Sidework\Matt\Fishermans_Windfarm\ProjectMapbook_85x11.mxd

Imagery: ESRI, 2011

Fishermen's Energy, LLC.

Amec Foster Wheeler
Environment & Infrastructure
690 Commonwealth Center
11003 Bluegrass Parkway
Louisville, KY 40299

MAP BY: daniel.conn

CHK'D BY: MEP

DATUM: North American 1983

PROJECTION: NAD 1983 UTM Zone 18N

SCALE: 1 inch = 1,000 feet

PROJECT:
Fishermen's Energy, LLC.
Atlantic City Windfarm

TITLE:
Project Area with Previously Identified
Historic Site Locations

TIME: 3:46:06 PM

DATE: 6/2/2015

PROJECT #: 775230003

FIGURE #8

U:\Sidework\Matt\Fishermans_Windfarm\ProjectMapbook_85x11.mxd

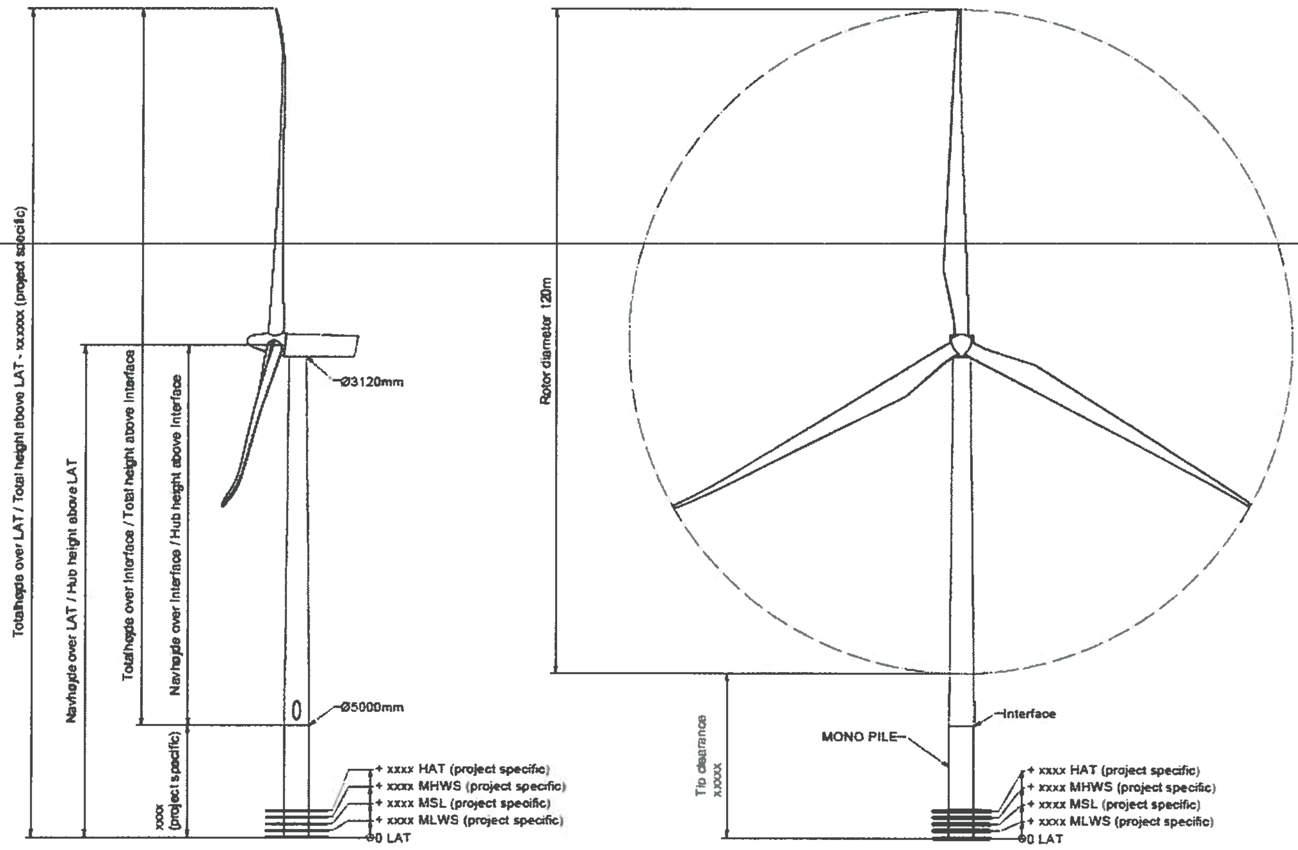
Imagery: ESRI, 2011

Appendix A

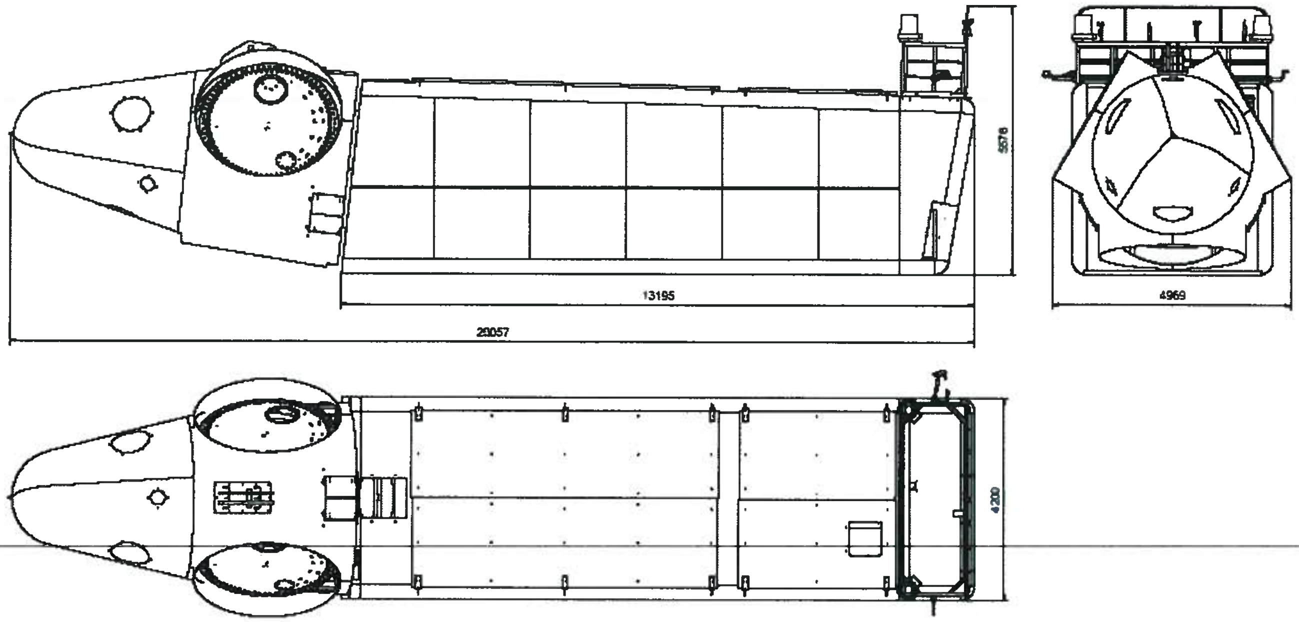
Turbine Information

SWT-3.6-120, Offshore Outside Dimensions and Weights

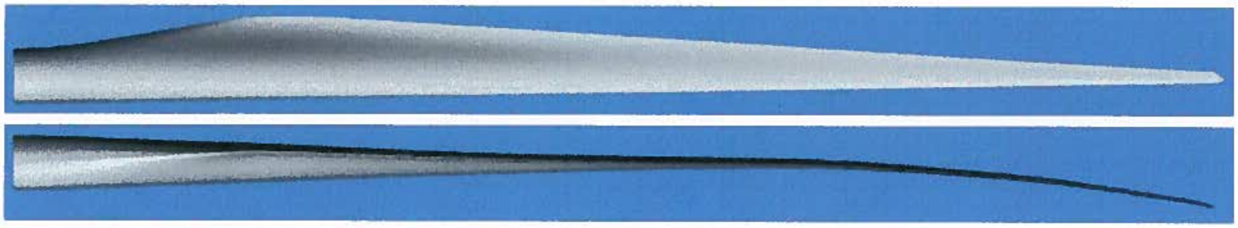
The following data regarding weights and dimensions of the SWT-3.6-120 wind turbine is generic and as such for information only.



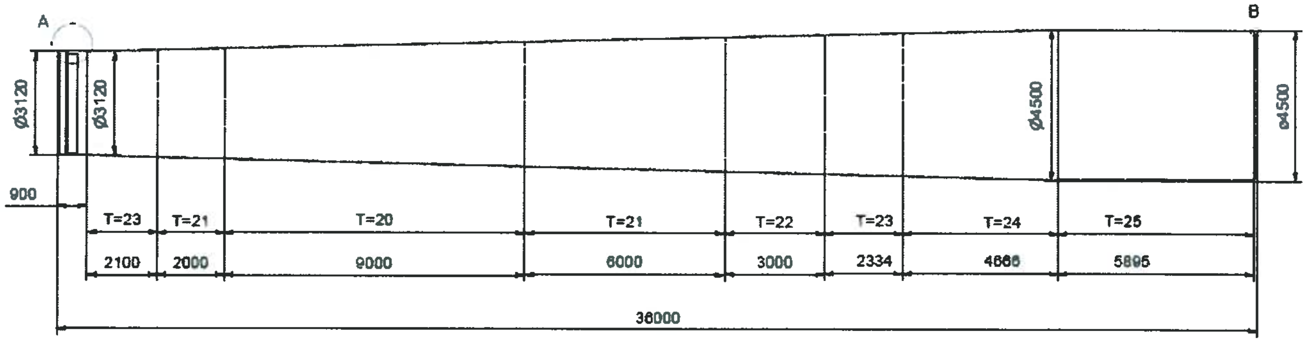
Elevation, SWT-3.6-120



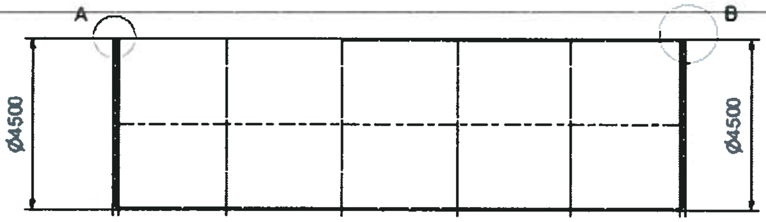
Nacelle and Hub, SWT-3.6-120
Weight app. 185 t without transport frame and lifting equipment



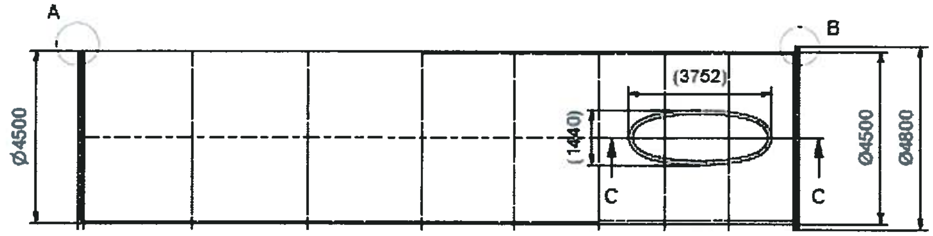
Blade B58, SWT-3.6-120
Length: 58.8 m, root diameter: 2.5 m, width: 4.2 m.
Weight app. 18 t (Weight of blade is without transport frame and lifting equipment)



Tower Top Section, SWT-3.6-120
Length: 36 m. Generic weight: app. 80 t without transport frame and lifting equipment
As towers are site specific, the weight may vary from the a.m.



Tower Intermediate Section, SWT-3.6-120
Length: 12.55 m. Generic weight: app. 50 t without transport frame and lifting equipment
As towers are site specific, the weight may vary from the a.m.



Tower Bottom Section, SWT-3.6-120
Length: 17.5 m. Generic weight: app. 95 t without internals, transport frame and lifting equipment
As towers are site specific, the weight may vary from the a.m.

Appendix B

Atlantic County - New Jersey and National Registers of Historic Places

Atlantic County

Absecon City

Captain Francis Babcock House (ID#172)
324 South Shore Road
NR: 7/28/1999 (NR Reference #: 99000907)
SR: 5/27/1999

Camden and Atlantic Railroad Historic District (ID#3862)
Railroad right-of-way from Pensauken and Camden to Atlantic City
SHPO Opinion: 9/17/2001
See Main Entry / Filed Location:
Atlantic County, Atlantic City

John Doughty House (ID#3946)
40 North Shore Road
NR: 3/5/2002 (NR Reference #: 02000107)
SR: 12/20/2001

Hinchman Warehouse Site (28-At-110) (ID#4243)
SHPO Opinion: 2/6/2004

North Shore Road Historic District (ID#3570)
North Shore Road from Creek Road Northward to Galloway Township Municipal Boundary
SHPO Opinion: 2/14/1996

Dr. Jonathan Pitney House (ID#1838)
57 North Shore Road
NR: 8/14/1998 (NR Reference #: 98001062)
SR: 6/26/1998

South Shore Road Historic District (ID#2935)
South side of Ohio Avenue, West of Absecon Creek and extends Southward along South Shore Road to Nevada Avenue
SHPO Opinion: 2/14/1996

Atlantic City

Absecon Lighthouse (ID#389)
Pacific and Rhode Island avenues
NR: 1/25/1971 (NR Reference #: 71000492)
SR: 9/11/1970

Administration Building for the Board of Education (ID#4870)
1809 Pacific Ave
SHPO Opinion: 3/17/2006

Atlantic City Armory (ID#4163)
Absecon Boulevard and New York Avenue
SHPO Opinion: 9/10/2004
(Previous SHPO opinion 4/17/2003)

Atlantic City Convention Hall (NHL, ID#390)
Boardwalk between Pacific, Mississippi, and Florida avenues
NR: 2/27/1987 (NR Reference #: 87000814)
SR: 3/2/1993
SHPO Opinion: 9/30/1983
(Previous SHPO Opinions: 6/15/1977, 5/11/1978)

Atlantic City High School (ID#4386)
Pacific and Ohio avenues
SHPO Opinion: 4/7/2004

Atlantic City Post Office (ID#391)
1701 Pacific Avenue
SHPO Opinion: 2/20/1980

Barclay Court (ID#392)
9-11 South Pennsylvania Avenue
NR: 6/22/1988 (NR Reference #: 88000725)
SR: 4/26/1988
SHPO Opinion: 12/8/1987
(Demolished)

Beth Israel Synagogue (ID#1849)
34 South Pennsylvania Avenue
SR: 11/16/1992

Beth Kehillah Synagogue Building (H.G. Rosin Senior Center) (ID#401)
901 Pacific Avenue
SHPO Opinion: 9/20/1993

Blenhiem Hotel (ID#3576)
Boardwalk and Ohio Avenue
NR: 8/23/1977
(Demolished October 1978)

Camden and Atlantic Railroad Historic District (ID#3862)
Railroad right-of-way from Pensauken and Camden to Atlantic City
SHPO Opinion: 9/17/2001
Also located in:
Atlantic County, Absecon City
Atlantic County, Egg Harbor Township
Atlantic County, Galloway Township
Atlantic County, Hammonton Town
Atlantic County, Mullica Township
Atlantic County, Pleasantville City
Camden County, Berlin Borough
Camden County, Camden City
Camden County, Cherry Hill Township
Camden County, Collingswood Borough
Camden County, Haddon Township
Camden County, Haddonfield Borough
Camden County, Lindenwold Borough
Camden County, Merchantville Borough
Camden County, Pennsauken Township
Camden County, Somerdale Borough
Camden County, Voorhees Township
Camden County, Waterford Township
Camden County, Winslow Township

Church of the Ascension (ID#393)
1601 Pacific Avenue
NR: 7/24/1986 (NR Reference #: 86001941)
SR: 6/16/1986

Equitable Trust Bank Building (ID#2927)

2030 Atlantic Avenue
SHPO Opinion: 6/9/1989

Federal Building and Post Office (ID#2928)

Pacific and Pennsylvania avenues
SHPO Opinion: 4/16/1986
(Demolished)

Fire Station #8 (ID#396)

140 North Indiana Avenue
DOE: 4/23/1981
SHPO Opinion: 3/30/1981

Fire Station #9 (ID#397)

734 North Indiana Avenue
DOE: 4/23/1981
SHPO Opinion: 3/30/1981

Friends Meeting House (ID#2929)

Pacific and South Carolina avenues
SHPO Opinion: 5/31/1985

Holmhurst Hotel (ID#398)

South Pennsylvania Avenue
NR: 1/18/1978 (NR Reference #: 78001732)
SR: 8/19/1977
(Demolished, March 1985.)

The Knife and Fork Restaurant (ID#4798)

29 S. Albany Avenue
SHPO Opinion: 7/30/2008

Madison Hotel (ID#399)

123 South Illinois Avenue
NR: 12/20/1984 (NR Reference #: 84000506)
SR: 11/1/1984
SHPO Opinion: 5/8/1984

The Strand and Marine Apartments (ID#4800)

3821- 3825 Boardwalk Avenue
SHPO Opinion: 7/30/2008

Morton Hotel (ID#400)

150 Virginia Avenue
NR: 7/15/1977 (NR Reference #: 77000843)
SR: 5/26/1977
(Demolished)

1315 Pacific Avenue (ID#2930)

1315 Pacific Avenue
SHPO Opinion: 12/16/1987

Raphael-Gordon House (ID#2931)

118 South Newton Street
SHPO Opinion: 4/11/1997

St. Nicholas of Tolentine Church (ID#395)

1409-1421 Pacific Avenue
NR: 2/2/2001 (NR Reference #: 00010039)
SR: 12/12/2000
SHPO Opinion: 7/11/1990
(SHPO Opinion for Convent Only)

Santa Rita Apartments (ID#402)

66 South Carolina Avenue
NR: 6/14/1991 (NR Reference #: 91000675)
SR: 4/12/1991

Segal Building (ID#394)

1200 Atlantic Avenue
NR: 2/9/1984 (NR Reference #: 84002517)
SR: 1/6/1984

Shelburne Hotel (ID#403)

Michigan Avenue and the Boardwalk
NR: 5/19/1978 (NR Reference #: 78001733)
SR: 3/7/1978
(Demolished)

South Maine Avenue Streetscape (ID#404)

South Maine Avenue between Atlantic Avenue and the Boardwalk
SHPO Opinion: 6/30/1993
(Demolished)

2-6 South Virginia Avenue (ID#405)

2-6 South Virginia Avenue
SHPO Opinion: 7/10/1991

Traymore Hotel (ID#3577)

Boardwalk and Illinois Avenue
NR: 12/13/1971
(Demolished)

Union Railroad Station (Bus Station) (ID#406)

2101 Arctic Avenue
SHPO Opinion: 3/31/1994
(Demolished)

USCG Station Atlantic City (ID#4745)

900 Beach Thorofare
SHPO Opinion: 7/16/2007

Warner Theatre (façade) (ID#2932)

Atlantic City Boardwalk between Michigan and Arkansas avenues
SHPO Opinion: 1/9/1996

Westside All Wars Memorial Building (ID#4524)

1510 Adriatic Avenue
SHPO Opinion: 9/23/2005

World War I Memorial (ID#407)

South Albany Avenue, Ventnor Avenue, an d O'Donnell Parkway
NR: 8/28/1981 (NR Reference #: 81000388)
SR: 7/2/1981

Buena Borough

Hebron Button Factory (ID#4801)

Weymouth Malaga Road & Aberdeen Avenue
SHPO Opinion: 7/21/2008

Buena Vista Township

Richland Hotel (ID#4825)

1302 Harding Way
COE: 7/31/2008

Corbin City

NJ Route 50 Bridge (SI&A #0510152) (ID#2933)

NJ Route 50 over Tuckahoe River
SHPO Opinion: 8/28/1996
(Previous SHPO Opinion 7/19/91)
See Main Entry / Filed Location:
Cape May County, Upper Township

South Tuckahoe Historic District (ID#3062)

NJ Route 50 and north portion of Tuckahoe-Mount Pleasant Road
NR: 3/7/1997 (NR Reference #: 97000103)
SR: 1/8/1997
SHPO Opinion: 8/28/1996
(SHPO Opinion was for a larger North and South Tuckahoe Historic Distirct)
See Main Entry / Filed Location:
Cape May County, Upper Township

North and South Tuckahoe Historic District (ID#3063)

NJ Route 50 and the Tuckahoe River
SHPO Opinion: 8/28/1996
(Southern portion listed as the South Tuckahoe Historic District)
See Main Entry / Filed Location:
Cape May County, Upper Township

Egg Harbor City

Egg Harbor City Fire Station (ID#409)

351 Cincinnati Avenue
SHPO Opinion: 9/20/1993
COE: 5/23/2006
(Previous SHPO Opinion 5/26/1988)

Egg Harbor City Historic District (ID#410)

Philadelphia Avenue
(7/24/2008: SHPO Opinion that HD is NOT ELIGIBLE)

Egg Harbor Commercial Bank (ID#4274)

134 Philadelphia Avenue
NR: 8/28/2007 (NR Reference #: 07000875)
SR: 6/25/2007
COE: 5/3/2004
(formerly identified as Old Commercial Bank)

Lower Bank Road Bridge (SI&A #03G8045) (ID#411)

Lower Bank Road (County Route 542) over Mullica River
SHPO Opinion: 5/15/1990
(Demolished c. 1992)
Also located in:
Burlington County, Washington Township

Mullica River / Chestnut Neck Archaeological Historic District (ID#385)

North and south sides of the Mullica River
SR: 10/1/1976
SHPO Opinion: 9/16/2002
See Main Entry / Filed Location:
Atlantic County, Mullica Township

Neutral Water Health Resort Sanitarium (ID#412)

Corner of Claudius Street and London Avenue
NR: 3/20/1991 (NR Reference #: 91000267)
SR: 1/29/1991
SHPO Opinion: 1/17/1978
(aka Dr. Smith's Sanitarium Site)

Egg Harbor Township

Camden and Atlantic Railroad Historic District (ID#3862)

Railroad right-of-way from Pensauken and Camden to Atlantic City
SHPO Opinion: 9/17/2001
See Main Entry / Filed Location:
Atlantic County, Atlantic City

Cannon Court Roadside Cabins (ID#4331)

6124 Black Horse Pike
SHPO Opinion: 9/28/2004

Garden State Parkway Historic District (ID#3874)

Entire Garden State Parkway Right-of-Way
SHPO Opinion: 10/12/2001
See Main Entry / Filed Location:
Cape May County, Lower Township

Captain John Jeffries Burial Marker (ID#414)

Palestine Bible Church Cemetery, County Route 559
NR: 6/14/1984 (NR Reference #: 84002511)
SR: 5/1/1984

Lakes Creek Prehistoric Site (28-At-96) (ID#413)

SHPO Opinion: 5/6/1992

Andrew B. Scull House (ID#4722)

1647 Mays Landing-Somers Point Road (CR 559)
SHPO Opinion: 5/15/2007

Studebaker Showroom (ID#310)

North West Corner Verona and Toulon avenues
SHPO Opinion: 12/18/1995

Estell Manor City

Bethlehem Loading Company Mays Landing Plant Archaeological Historic District (ID#427)

109 NJ Route 50
NR: 7/12/2006 (NR Reference #: 06000559)
SR: 12/19/2005
SHPO Opinion: 4/11/1985
(Remains of internal rail system)

Estellville Glassworks Industrial Historic District (ID#415)

Estell Manor Park, Stevens Creek, Maple Avenue, Walkers Forge Road, and NJ Route 50
NR: 11/21/1991 (NR Reference #: 91001678)
SR: 10/2/1991
COE: 1/18/1990

Head of the River Church (ID#416)

NJ Route 49 at Aetna Drive
NR: 3/7/1979 (NR Reference #: 79001467)
SR: 12/19/1977

Folsom Borough

Jacobus Evangelical Lutheran Church (ID#417)

Mays Landing Road
NR: 6/9/1988 (NR Reference #: 88000635)
SR: 9/1/1987

Galloway Township

Anonymous Roadside Cabins (ID#4329)

US Route 30 and Taylor Avenue
SHPO Opinion: 9/28/2004

Camden and Atlantic Railroad Historic District (ID#3862)

Railroad right-of-way from Pensauken and Camden to Atlantic City
SHPO Opinion: 9/17/2001
See Main Entry / Filed Location:
Atlantic County, Atlantic City

Conovertown Historic District (ID#418)

Along New York Road between Brook Lane and the border with Absecon City, west on Biscayne Avenue to the Lutheran Church
SHPO Opinion: 8/5/1992

The Country Motel Roadside Cabins (ID#4330)

201 White Horse Pike
SHPO Opinion: 9/28/2004

Frankfurt Avenue Bridge (ID#4464)

Frankfurt Avenue over New Jersey Transit Atlantic City Line
SHPO Opinion: 7/13/2005

Garden State Parkway Historic District (ID#3874)

Entire Garden State Parkway Right-of-Way
SHPO Opinion: 10/12/2001
See Main Entry / Filed Location:
Cape May County, Lower Township

Modern Boat Works (ID#419)

US Route 9 at Nacote Creek
SHPO Opinion: 6/12/1987

Mullica River / Chestnut Neck Archaeological Historic District (ID#385)

North and south sides of the Mullica River
SR: 10/1/1976
SHPO Opinion: 9/16/2002
See Main Entry / Filed Location:
Atlantic County, Mullica Township

Oceanville / Leeds Point / Moss Mill Historic District (ID#420)

Bounded by New York Road, Somers Town Lane, Leeds Point Road, and Moss Mill Road
SHPO Opinion: 8/5/1992

Old US Coast Guard Station (ID#4041)

Little Beach Island, Brigantine National Wildlife Refuge
NR: 6/23/1976
(Demolished)

L.N. Renault and Sons Winery (ID#421)

Bremen Avenue and Leibig Street
SR: 6/15/1973

Roadside Cabins (ID#4339)

US Route 30 and 5th Avenue
SHPO Opinion: 7/28/2003

Smithville Apothecary (ID#422)

Smithville-Old Towne and Moss Mill roads
NR: 6/9/1978 (NR Reference #: 78001734)
SR: 12/20/1976

Hamilton Township

Abbott's Modern Cabins (ID#336)

217 NJ Route 40
SR: 9/7/1982
DOE: 10/26/1982
(DOE/Owner Objection)

Charcoal Kilns [Site] (ID#337)

SHPO Opinion: 6/24/1987

Mays Landing Historic District (ID#338)

East and West Main streets and intersecting streets
NR: 8/23/1990 (NR Reference #: 90001245)
SR: 1/11/1990

Mays Landing Presbyterian Church (ID#339)

Main Street and Cape May Avenue
NR: 4/20/1982 (NR Reference #: 82003261)
SR: 4/21/1981

Samuel Richards Hotel (ID#340)

106 East Main Street
NR: 8/31/1979 (NR Reference #: 79001468)
SR: 6/19/1979

Schooner "Weymouth" [Site] (ID#342)

NR: 4/25/1985 (NR Reference #: 85000874)
SR: 3/12/1985

US Route 322 and NJ Route 50 Cloverleaf (ID#2937)

SHPO Opinion: 11/8/1993
(DOE denied, 1997; Demolished)

West Jersey and Atlantic Railroad Historic District (ID#2938)

Mays Landing, Hamilton Township to Pleasantville City, Atlantic County
SHPO Opinion: 8/28/1996
Also located in:
Atlantic County, Pleasantville City

Weymouth Archaeological Historic District (ID#341)
SHPO Opinion: 11/1/1984
COE: 1/18/1990
(Previous SHPO Opinion 4/3/1984)

Weymouth Road Bridge (SI&A #01HML22) (ID#3791)
Weymouth Road Bridge over Great Egg Harbor River
NR: 6/21/2001 (NR Reference #: 01000671)
SR: 5/7/2001
(SI&A #01HML22)

Woodland Period Prehistoric Archaeological Site (28-At-24) (ID#343)
SHPO Opinion: 6/20/1983

Hammonton Town

William L. Black House (ID#344)
458 Bellevue Avenue
NR: 8/26/1993 (NR Reference #: 93000828)
SR: 7/2/1993

Camden and Atlantic Railroad Historic District (ID#3862)
Railroad right-of-way from Pensauken and Camden to Atlantic City
SHPO Opinion: 9/17/2001
See Main Entry / Filed Location:
Atlantic County, Atlantic City

Eagle Theatre (ID#4869)
208 Vine Street
COE: 2/20/2009

Hammonton Commercial Historic District (ID#345)
Roughly bounded by Third, Washington, Orchard and Vine streets
SHPO Opinion: 9/20/1993

Linwood City

Linwood Borough School No. 1 (Linwood Public Library) (ID#346)
16 West Poplar Street
NR: 12/20/1984 (NR Reference #: 84000510)
SR: 11/1/1984

Linwood Historic District (ID#347)
Maple and Poplar avenues, and Shore Road
NR: 7/13/1989 (NR Reference #: 89000800)
SR: 4/27/1989

Thomas & Mary Ingersall Naylor House (ID#4866)
204 West Garfield Avenue
COE: 1/28/2009

Longport Borough

Church of the Redeemer (ID#382)
20th and Atlantic avenues
NR: 9/10/1992 (NR Reference #: 92001179)
SR: 7/27/1992

Great Egg Coast Guard Station Building (ID#4255)
2301 Atlantic Avenue
NR: 10/31/2005 (NR Reference #: 05000128)
SR: 1/4/2005
COE: 4/1/2004

Ocean City-Longport Bridge (SI&A #3100001) (ID#1012)
Ocean Drive over Great Egg Harbor
SHPO Opinion: 11/10/1993
(Demolished)
See Main Entry / Filed Location:
Cape May County, Ocean City

Margate City

Lucy, The Margate Elephant (NHL, ID#383)
Decatur and Atlantic avenues
NR: 8/12/1971 (NR Reference #: 71000493)
SR: 4/7/1971

Marven Gardens Historic District (ID#384)
Between Ventnor, Fredericksburg, Winchester and Brunswick avenues
NR: 9/13/1990 (NR Reference #: 90001440)
SR: 8/9/1990

Mullica Township

Camden and Atlantic Railroad Historic District (ID#3862)
Railroad right-of-way from Pensauken and Camden to Atlantic City
SHPO Opinion: 9/17/2001
See Main Entry / Filed Location:
Atlantic County, Atlantic City

Green Bank Road Bridge over Mullica River (SI&A #01M0001) (ID#2810)
SHPO Opinion: 8/31/1995
Also located in:
Burlington County, Washington Township

Mullica River / Chestnut Neck Archaeological Historic District (ID#385)
North and south sides of the Mullica River
SR: 10/1/1976
SHPO Opinion: 9/16/2002
Also located in:
Atlantic County, Egg Harbor City
Atlantic County, Galloway Township
Burlington County, Bass River Township
Burlington County, Washington Township
Ocean County, Little Egg Harbor Township

Pleasant Mills (ID#2802)
Elwood-Pleasant Mills Road
NR: 3/3/1995 (NR Reference #: 95000182)
SR: 1/24/1995
SHPO Opinion: 8/31/1995
(Included within boundaries of previously listed Batsto Historic Distirct)

Northfield City

1715 Tilton Road (ID#25)

1715 Tilton Road
SHPO Opinion: 11/9/1999

Risley Homestead (ID#386)

8 Virginia Avenue
NR: 5/31/1991 (NR Reference #: 91000609)
SR: 4/2/1991

Pleasantville City

Camden and Atlantic Railroad Historic District (ID#3862)

Railroad right-of-way from Pensauken and Camden to Atlantic City
SHPO Opinion: 9/17/2001
See Main Entry / Filed Location:
Atlantic County, Atlantic City

213 Verona Avenue (ID#2939)

213 Verona Avenue
SHPO Opinion: 12/18/1995

West Jersey and Atlantic Railroad Historic District (ID#2938)

Mays Landing, Hamilton Township to Pleasantville City, Atlantic County
SHPO Opinion: 8/28/1996
See Main Entry / Filed Location:
Atlantic County, Hamilton Township

Port Republic City

Amanda Blake Store (ID#387)

104 Main Street
NR: 1/25/1979 (NR Reference #: 79001469)
SR: 9/5/1978

Chestnut Neck Battle Monument (ID#4327)

US Route 9 and Old York Road
SHPO Opinion: 9/28/2004

Garden State Parkway Historic District (ID#3874)

Entire Garden State Parkway Right-of-Way
SHPO Opinion: 10/12/2001
See Main Entry / Filed Location:
Cape May County, Lower Township

Gulf Service Station (ID#4328)

758 Old New York Road
SHPO Opinion: 9/28/2004

Port Republic Historic District (ID#388)

Central and Pomona avenues, Riverside Drive, St. Johns Lane, Chestnut Neck, Clarks Landing, and Port Republic-Smithville roads
NR: 5/16/1991 (NR Reference #: 91000596)
SR: 4/1/1991

Smithville-Port Republic Road Bridge (SI&A #01PR007) (ID#2940)

Smithville-Port Republic Road over Nacote Creek
SHPO Opinion: 9/3/1993

Somers Point City

Bay Front Historic District (ID#423)

Parts of Anna, Bay, Decatur, Delaware, Gibbs, Higbee, New Jersey, and Somers avenues
NR: 3/23/1989 (NR Reference #: 89000227)
SR: 2/9/1989

Garden State Parkway Historic District (ID#3874)

Entire Garden State Parkway Right-of-Way
SHPO Opinion: 10/12/2001
See Main Entry / Filed Location:
Cape May County, Lower Township

Somers Mansion (ID#424)

Shore Road, adjacent to NJ Route 52 traffic circle
NR: 12/18/1970 (NR Reference #: 70000378)
SR: 9/11/1970

World War [One] Memorial Bridge (SI&A# 0511153) (ID#3059)

NJ Route 52 over Ship Channel
SHPO Opinion: 1/26/1996
See Main Entry / Filed Location:
Cape May County, Ocean City

Ventnor City

Saint Leonard's Tract Historic District (ID#426)

Bounded by Atlantic Avenue, South Cambridge Avenue, Winchester Avenue and South Surrey Avenue
SHPO Opinion: 12/30/1993

John Stafford Historic District (ID#425)

Portions of Atlantic, Austen, Baton Rouge, Marion, and Vassar avenues
NR: 6/9/1988 (NR Reference #: 88000723)
SR: 4/26/1988
SHPO Opinion: 5/28/1987

Ventnor City Hall (ID#2941)

6201 Atlantic Avenue
NR: 10/10/1996 (NR Reference #: 96001088)
SR: 8/20/1996
SHPO Opinion: 11/30/1977
COE: 5/14/1992

Weymouth Township

Belcoville Post Office (ID#4190)

1201 Madden Avenue
NR: 3/14/2008 (NR Reference #: 08000174)
SR: 12/21/2007
COE: 7/23/2003

Appendix C

Additional Information on Historical Sites

Form No. 10-300 (Rev. 10-74)

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

NATIONAL REGISTER OF HISTORIC PLACES INVENTORY -- NOMINATION FORM

FOR NPS USE ONLY
RECEIVED
DATE ENTERED

SEE INSTRUCTIONS IN *HOW TO COMPLETE NATIONAL REGISTER FORMS*
TYPE ALL ENTRIES -- COMPLETE APPLICABLE SECTIONS

1 NAME

HISTORIC "LUCY" THE MARGATE ELEPHANT

AND/OR COMMON

2 LOCATION

STREET & NUMBER Margate City

☐ NOT FOR PUBLICATION

CITY, TOWN

☐ VICINITY OF

CONGRESSIONAL DISTRICT 2nd

STATE New Jersey

CODE

COUNTY Atlantic

CODE

3 CLASSIFICATION

CATEGORY	OWNERSHIP	STATUS	PRESENT USE	
☒ DISTRICT	☒ PUBLIC	☐ OCCUPIED	☐ AGRICULTURE	☒ MUSEUM
☐ BUILDING(S)	☐ PRIVATE	☒ UNOCCUPIED	☐ COMMERCIAL	☐ PARK
☐ STRUCTURE	☐ BOTH	☒ WORK IN PROGRESS	☒ EDUCATIONAL	☐ PRIVATE RESIDENCE
☐ SITE	**PUBLIC ACQUISITION**	**ACCESSIBLE**	☐ ENTERTAINMENT	☐ RELIGIOUS
☐ OBJECT	☐ IN PROCESS	☒ YES: RESTRICTED	☐ GOVERNMENT	☐ SCIENTIFIC
	☐ BEING CONSIDERED	☐ YES: UNRESTRICTED	☐ INDUSTRIAL	☐ TRANSPORTATION
		☐ NO	☐ MILITARY	☐ OTHER:

4 OWNER OF PROPERTY

NAME Margate City

STREET & NUMBER Ventor and Washington Avenues

CITY, TOWN Margate City

☐ VICINITY OF

STATE New Jersey

5 LOCATION OF LEGAL DESCRIPTION

COURTHOUSE, REGISTRY OF DEEDS, ETC. Atlantic City Surrogate's Office

STREET & NUMBER Main Street

CITY, TOWN Margate City

STATE New Jersey

6 REPRESENTATION IN EXISTING SURVEYS

TITLE Historic American Buildings Survey

DATE 1969

☒ FEDERAL ☐ STATE ☐ COUNTY ☐ LOCAL

DEPOSITORY FOR SURVEY RECORDS Library of Congress

CITY, TOWN Washington, D.C.

STATE

7 DESCRIPTION

CONDITION		CHECK ONE	CHECK ONE	
☐ EXCELLENT	☐ DETERIORATED	☐ UNALTERED	☐ ORIGINAL SITE	
☒ GOOD	☐ RUINS	☒ ALTERED	☒ MOVED	DATE______
☐ FAIR	☐ UNEXPOSED			

DESCRIBE THE PRESENT AND ORIGINAL (IF KNOWN) PHYSICAL APPEARANCE

John Milner, AIA Architect of the restoration, has provided the following description:

The most appropriate early description of Lucy the Elephant was written by her inventor, James V. Lafferty, and included in his petition to the Commissioner of Patents dated May 19th, 1882.

> "My invention consists of a building in the form of an animal (i.e. an Elephant) the body of which is floored and divided into 2 rooms, closets, etc., and the legs contain the stairs which lead to the body, said legs being hollow so as to be of increased strength for properly supporting the body, and the elevation of the body permitting the circulation of air below the same, the entire device presenting a unique appearance, and producing a building which is well ventilated and lighted.
>
> A chute communicates with the front of the body and extends to the ground where it may be connected with a sewer or other conduit for conveying slops, ashes, etc., to the sewer or conduit, said chute being of the form of the trunk of the elephant and containing trussing . . . for supporting the front of the body, said trussing being concealed by the covering or wall of the trunk.
>
> The lower end of the chute enters or is connected with a box around which is a seat, said box resting on the ground or proper supports thereon and concealing said lower end of the chute and the connection with the conduit and presenting the appearance of a trough from which the animal is feeding or drinking.
>
> An upper story may be supported on the body, access whereto is had from the floor by means of stairs which are properly located in the walls of the body and sustained in position, said story being in the form of a howdah which completing the semblance of a bedecked elephant, acts as the observatory of the building.
>
> It will be seen that the structure is novel and unique."

Lucy was assembled basically as a large frame box, composed of massive 12" x 12" timbers. The structural frame was carefully braced with diagonal members, providing a rigid system which has successfully withstood heavy winds and storms for nearly a century. Lucy's shape was achieved by applying curved built-up members over the frame and enclosing the whole composition with sheathing boards and heavy terne plate.

Legend tells us that Lafferty used a live elephant, which he chained to the beach, as a model for Lucy. But in fact, Lafferty and a man named William Free

(continued)

8 SIGNIFICANCE

PERIOD

☐ PREHISTORIC
☐ 1400-1499
☐ 1500-1599
☐ 1600-1699
☐ 1700-1799
☒ 1800-1899
☐ 1900-

AREAS OF SIGNIFICANCE -- CHECK AND JUSTIFY BELOW

☐ ARCHEOLOGY-PREHISTORIC
☐ ARCHEOLOGY-HISTORIC
☐ AGRICULTURE
☐ ARCHITECTURE
☐ ART
☐ COMMERCE
☐ COMMUNICATIONS
☐ COMMUNITY PLANNING
☐ CONSERVATION
☐ ECONOMICS
☐ EDUCATION
☐ ENGINEERING
☐ EXPLORATION/SETTLEMENT
☐ INDUSTRY
☒ INVENTION
☐ LANDSCAPE ARCHITECTURE
☐ LAW
☐ LITERATURE
☐ MILITARY
☐ MUSIC
☐ PHILOSOPHY
☐ POLITICS/GOVERNMENT
☐ RELIGION
☐ SCIENCE
☒ SCULPTURE
☐ SOCIAL/HUMANITARIAN
☐ THEATER
☐ TRANSPORTATION
☒ OTHER (SPECIFY) "architectural folly"

SPECIFIC DATES 1881

BUILDER/ARCHITECT James V. Lafferty

STATEMENT OF SIGNIFICANCE

Architectural Follies are now generally accepted as a legitimate architectural expression. They are still a strange and startling sight to those used to structures of a traditional form. "Lucy" is one of those now rare examples of what G.E. Kidder-Smith calls Zoomorphic vernacular and she is the last of the American breed--two others, one at Cape May, New Jersey and the other at Coney Island have long since disappeared.

Constructing oversized elephant-buildings is not a new idea--in the 19th century the practice approached the significance of a cult. Clay Lancaster, in his book on Architectural Follies, discusses the breed at length, from Ptolemy's dummy on wheels, Phillip of Burgundy's 15th century mechanical elephant, Henri II had several elephant automatons propelled by men inside and two great French schemes for elephant-buildings that never materialized, one for Louis XV by Ribart and the other for Napoleon by Alavoine.

Lancaster goes on to place Lucy in this genealogy:

> "Such grandiosity as that of an Elephant Triomphal would be out of place in America, but by the very virtue of abandoning the superficial trimmings Americans often were able to bring the essential features to realization. An elephant building exists in America. It is referred to as the Elephant House, or, more usually, as the Elephant Hotel at Margate City, near Altantic City, New Jersey. No pedestal or platform supports this elephant, for he is a pleb pedestrian with feet planted firmly on the ground. In the practical American manner he is depicted in a feeding attitude. Summer vacationists have flocked to this section of the Atlantic coast for several generations, and a good percentage still go to view the baggy-kneed landmark. Constructed by James V. Lafferty about 1883, the monster has an overall length of about seventy-five feet, the height to the peak of the original howdah surpassing this measurement by ten feet. Over a million pieces of timber went into the construction of the thing, plus four tons of bolts, bars, and nails, and twelve thousand square feet of tin for covering it--according to the leaflet passed out by the proprietors.
>
> Twin newel stairways are in the hind legs, one for ascent and the other for descent. The interior space is divided up into rooms devoted to the ordinary purposes of a house, including a reception room eighteen feet square, dining room, kitchen, and several bedrooms.

(continued)

9 MAJOR BIBLIOGRAPHICAL REFERENCES

See continuation sheet

---

10 GEOGRAPHICAL DATA

ACREAGE OF NOMINATED PROPERTY

UTM REFERENCES

Latitude 39 19' 15'
Longitude 74 30'44''

	ZONE	EASTING	NORTHING		ZONE	EASTING	NORTHING
A				B			
C				D			

VERBAL BOUNDARY DESCRIPTION

See continuation sheet

LIST ALL STATES AND COUNTIES FOR PROPERTIES OVERLAPPING STATE OR COUNTY BOUNDARIES

STATE	CODE	COUNTY	CODE

STATE	CODE	COUNTY	CODE

11 FORM PREPARED BY

NAME / TITLE
Carolyn Pitts, Architectural Historian

ORGANIZATION
Historic Sites Survey, National Park Service

DATE

STREET & NUMBER
1100 L Street, N.W.

TELEPHONE
202-523-5464

CITY OR TOWN
Washington, D.C. 20240

STATE

12 STATE HISTORIC PRESERVATION OFFICER CERTIFICATION

THE EVALUATED SIGNIFICANCE OF THIS PROPERTY WITHIN THE STATE IS:

NATIONAL ___ STATE ___ LOCAL ___

As the designated State Historic Preservation Officer for the National Historic Preservation Act of 1966 (Public Law 89-665), I hereby nominate this property for inclusion in the National Register and certify that it has been evaluated according to the criteria and procedures set forth by the National Park Service.

FEDERAL REPRESENTATIVE SIGNATURE

TITLE

DATE

FOR NPS USE ONLY

I HEREBY CERTIFY THAT THIS PROPERTY IS INCLUDED IN THE NATIONAL REGISTER

DATE

DIRECTOR, OFFICE OF ARCHEOLOGY AND HISTORIC PRESERVATION

ATTEST:

DATE

KEEPER OF THE NATIONAL REGISTER

designed the building without any such aid. J. Mason Kirby, a Quaker from Philadelphia, performed the actual construction, which eventually cost Lafferty $38,000.

Lucy's skeleton is a large frame box of 12x12 inch timbers and 8,560 wooden ribs. Her skin is 12,000 square feet of heavy tin and 24 glass windows. Her body measures 80 feet in circumference and 38 feet in length. Her ears are 17 feet long, her tusks 22 feet. The trunk is 26 feet long and was designed to double as a chute for garbage disposal. The whole elephant weighs 90 tons.

Access to the interior was gained through two spiral staircases, one in each rear leg. The walls and ceiling are plastered and the floors were wood. A beaded wainscot extended around the perimeter of the main space, and miniature pointed doorways led to the side rooms. The original interior woodwork was in the Gothic Revival style.

The original domed interior space was partitioned into separate rooms in 1902. In 1928 a violent storm blew off the original ornate howdah, and it was replaced by the present howdah. With these two exceptions, Lucy has undergone only minor alterations and repairs. Most of her original fabric remains although in poor condition.

Although Lucy's present exterior appearance is somewhat weary, it reflects only surface deterioration. Her structural frame has remained in good condition, due largely to the ample air spaces around the timbers, which have eliminated prolonged dampness. These air spaces will greatly facilitate the installation of new heating, cooling, and electrical systems to be included as part of the restoration.

Twenty windows are for the admission of light, besides the eighteen-inch portholes that serve for eyes. Staircases to each side of the belly take one to the howdah, where, from an elevation of sixty-five feet, is obtained a wide vista of the sea. The cost of building the elephant is said to have been $38,000.

Lafferty built a similar hotel on Coney Island at about the same time, though the latter one only survived until 1896 in which year the elephant was burned (or some say, was cremated). The Coney Island construction, billed as the 'Elephant Colussus, was bigger than the one farther down the Atlantic coast; it had complete stories within the torso, the overall height amounting to 122 feet. The interior of this jumbo was put to good usage, one accommodating a cigar store and the other a diorama, later one or the other converted into an elevator shaft. Staircases were in the hind legs and one could engage a room in any part of the animal's anatomy. A third elephant, 'the Light of Asia,' was built at Cape May in 1885 but she died of neglect and vandalism in 1900.

A patent was taken out on the invention by James V. Lafferty. It was filed 3 June 1882, and granted on December the 5th. The description was accompanied by a diagram representing a side elevation and plan of the 'building in the form of an animal, the body of which is floored and divided into rooms, closets, and Etc., and the legs contain the stairs . . . said legs being hollow, so as to be of increased strength for properly supporting the body.' One wonders that old Mother Nature never thought of the supporting quality of hollow legs; but, on the other hand, how could Mr. Lafferty locate his stairs in them if they weren't? There is only a single large, rectangular room, however, the leftover spaces all portioned off into closets, and even inner-closets. The trunk was a useful member, having a chute inside (marked 'F' on plans) for the disposal of 'slops, ashes, etc.' In the next paragraph we read: 'The elevation of the body permits the circulation of air beneath it and removes it from the dampness and moisture of the ground . . . Furthermore, the body is exposed to light and air on all sides, wherefore it provides a healthy and suitable place of occupancy for invalids and others.'"

For 90 years Lucy has been admired by children, a source of amusement for adults and occasionally a sobering influence--there is a tale that "sailors on ships in the Atlantic are said to have given up rum abruptly after one sight of Lucy towering on the beach looking directly out to sea at them."

(continued)

UNITED STATES DEPARTMENT OF THE INTERIOR
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NATIONAL REGISTER OF HISTORIC PLACES INVENTORY -- NOMINATION FORM

"Lucy" the Margate Elephant
CONTINUATION SHEET ITEM NUMBER 8 PAGE 3

In the last several years the elephant has been the object of a preservation campaign with funding from Federal sources (National Park Service, HUD Bicentennial Commission), State and private donors. Her credentials include the National Register of Historic Places, and the Historic American Buildings Survey (National Park Service). During 1974, 12,000 visitors arrived and 18,000 more came in 1975. The elephant has been stabilized, painted and completely restored--she will have a new howdah when funds permit. Lucy is now almost unique and an important Victorian monument in the history of American architecture.

Addendum:

An architectural folly comes from the French folie which meant "Delight" or "favorite abode." The English gave the term the added connotation of something uncomplimentary reflecting the foolishness of the builder. More follies were built in America than anywhere else and they are usually incomplete due to the bad planning of the builder or out of scale and style, often whimsical. An architectural folly is now an accepted architectural category.

Many famous follies have long since disappeared: P. T. Barnum's "Iranistan," Mrs. Trollope's "Bazaar," and "Flower's Folly" at Fiskkill, New York. The old world had follies as well--the Tower of Babel, the Villa Palagonia in Sicily and near Paris the Désert de Retz--all now in ruins. The Brighton Pavilion, however, has been splendidly restored. Follies came in all sizes and shapes and made of a variety of materials, some designed by famous architects, many by anonymous craftsmen.

Form No. 10-300a
(Rev. 10-74)

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CONTINUATION SHEET "Lucy" the Margate Elephant ITEM NUMBER 9 PAGE 1

Partial List of Publications In Which "Lucy" the Margate Elephant is Featured.

Cunningham, John T. The New Jersey Sampler.

Lancaster, Clay. Architectural Follies of America.

Boucher, Jack E. Absegami Yesteryear.

Devlin, Harry. What Kind of a House is That?

American Heritage, April, 1975.

Architecture Plus, The International Magazine of Architecture, November, 1973.

SO JEX, Convention Booklet, April 14, 1972.

Atlantic City & County ABC Book, Atlantic City Dept. of Public Relations, 1975.

Life, August 21, 1970.

American Home, July 1971.

Constructioneer, October 19, 1970.

Americana. The American Heritage Society, July 1974.

Architecture, New Jersey, November/December 1970.

My Weekly Reader, May 7, 1975.

Zur Zeit, Oct. 10, 1972.

Where, March 7, 1970.

Journal of the Society of Architectural Historians.

New York News Magazine, September 16, 1973.

House Beautiful, August 1974.

South Jersey Magazine, Summer 1974.

National Heritage, 1975.

Form No. 10-300a
(Rev. 10-74)

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

NATIONAL REGISTER OF HISTORIC PLACES INVENTORY -- NOMINATION FORM

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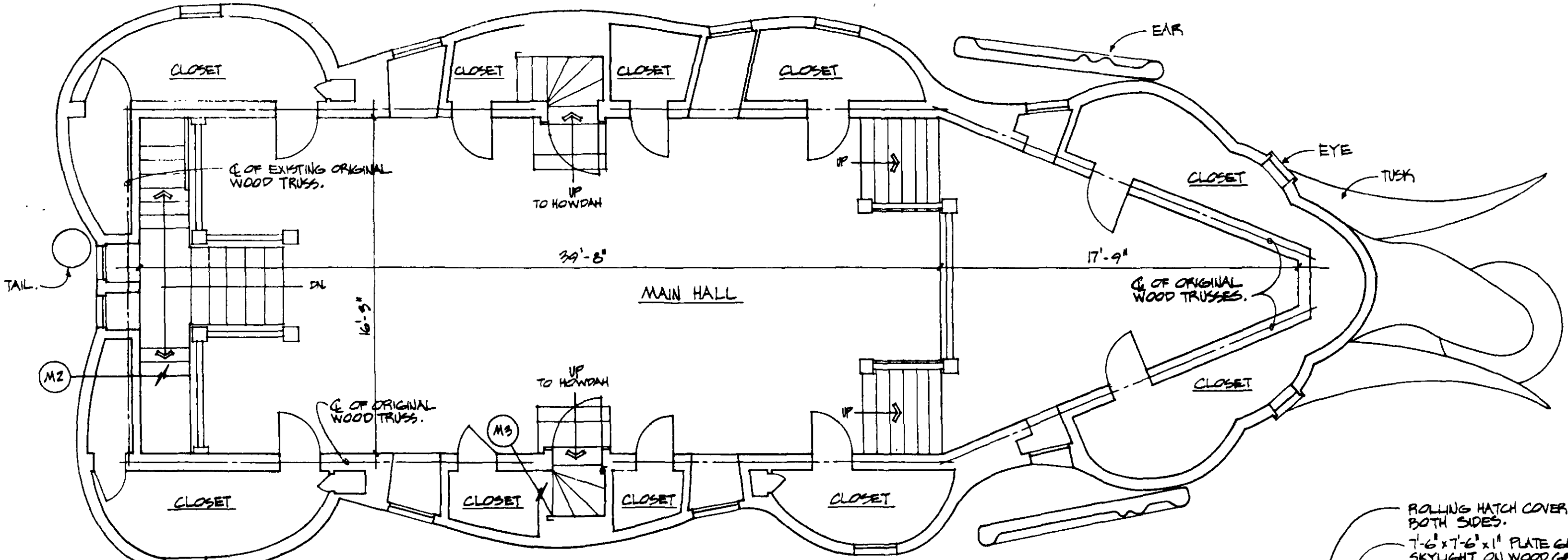
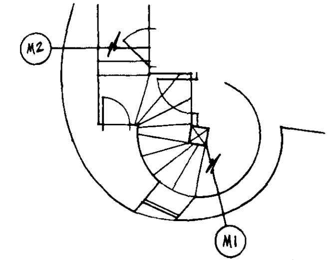
"Lucy" the Margate Elephant	10	1
CONTINUATION SHEET	ITEM NUMBER	PAGE

BEGINNING at a point at the intersection of the South Line of Atlantic Avenue with the west line of Decatur Avenue and extends (1) West along the South line of Atlantic Avenue, one hundred five and one half feet (105 1/2) to a point being the division line of lands of estate of Israel G. Adams, thence (2) to a point width, extending south between parallel lines one of which is the West line of Decatur Avenue and the other the said division line above mentioned twenty five hundred and seventy five (2575) feet more or less, to the Exterior line established by the Riparian Commission of New Jersey in Atlantic Ocean, said Decatur Avenue being forty feet wide.

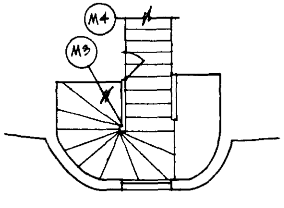


MAIN FLOOR PLAN

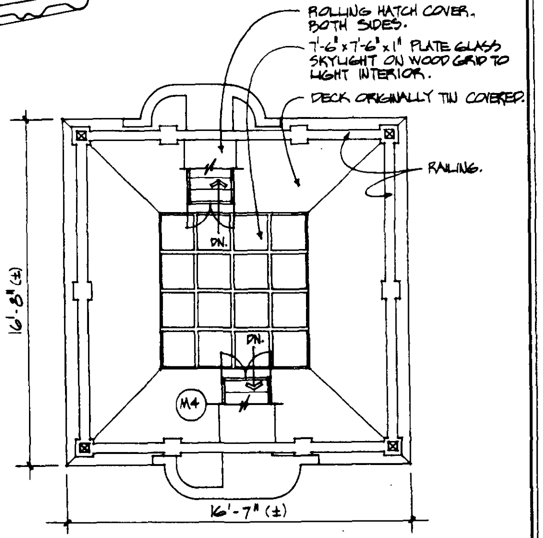
ORIGINAL INTERIOR FINISHES: INTEGRALLY COLORED PLASTER (GASTRIC PINK) WALLS AND VAULTED CEILING WITH BEADED BOARD DADO. DOOR AND WINDOW TRIM, RAILINGS AND OTHER WOODWORK (LARGELY EXTANT) IS GOTHIC REVIVAL IN STYE. ALL WOOD WAINSCOTING AND TRIM WAS ORIGINALLY STAINED AND VARNISHED.



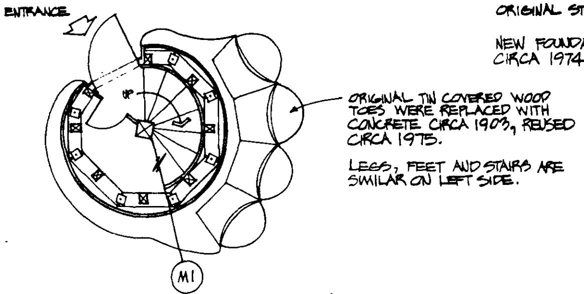
STAIR UP TO MAIN FLOOR



STAIR UP TO HOWDAH



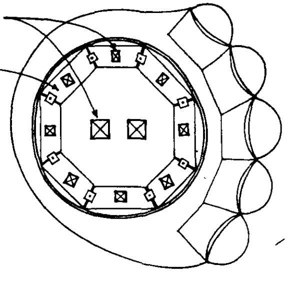
HOWDAH PLAN



ORIGINAL TIN COVERED WOOD TOES WERE REPLACED WITH CONCRETE CIRCA 1903, REUSED CIRCA 1975.

LEGS, FEET AND STAIRS ARE SIMILAR ON LEFT SIDE.

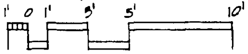
RIGHT REAR FOOT PLAN



RIGHT FRONT FOOT PLAN

Ⓜ INDICATES MATCH LINE

SCALE: ¼" = 1'-0"



DRAWN BY: JEFFREY C. BOURKE 1976

PREPARED FOR THE
SAVE LUCY COMMITTEE, INCORPORATED
BY JOHN D. MILNER AIA ARCHITECT
UNDER DIRECTION OF THE NATIONAL PARK SERVICE,
UNITED STATES DEPARTMENT OF THE INTERIOR

NAME AND LOCATION OF STRUCTURE
LUCY THE MARGATE ELEPHANT
ATLANTIC AVENUE & DECATUR STREET, MARGATE, ATLANTIC COUNTY, NEW JERSEY

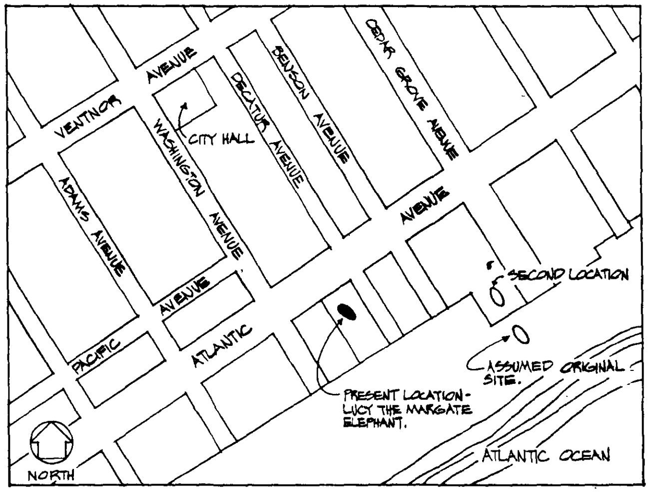
SURVEY NO.

HISTORIC AMERICAN
BUILDINGS SURVEY
SHEET 2 OF 4 SHEETS

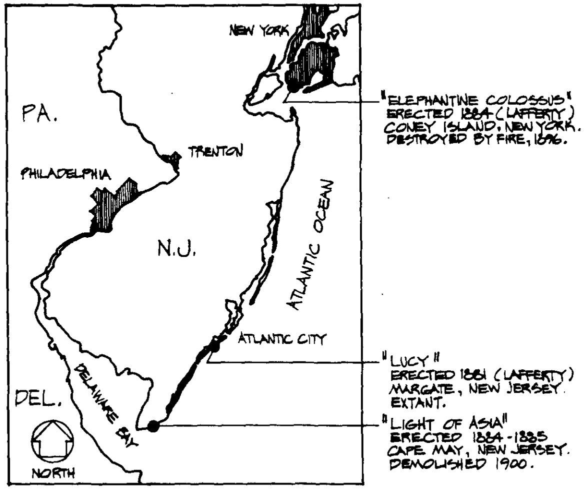
LIBRARY OF CONGRESS
INDEX NUMBER

·LUCY· THE MARGATE ELEPHANT

ATLANTIC AVENUE AND DECATUR STREET, MARGATE, ATLANTIC COUNTY, NEW JERSEY



LOCATION MAP (SHOWING PART OF MARGATE CITY, NEW JERSEY)



REGIONAL MAP

JAMES V. LAFFERTY OF PHILADEPHIA CONCEIVED THE HUGE PACHYDERM AS A REAL ESTATE PROMOTION TO SPUR DEVELOPMENT OF SOUTH ATLANTIC CITY. DESIGNED BY WILLIAM FREE, THE WOOD FRAME - TIN CLAD STRUCTURE WAS ERECTED ON THE BEACH IN 1881 BY J. MASON KIRBY (CARPENTER) AND LORENZ BYE (TIN SMITH) AND IS A UNIQUE EXAMPLE OF THE AMERICAN "ARCHITECTURAL FOLLIES" OF THE VICTORIAN PERIOD. ON DECEMBER 5, 1882, LAFFERTY WAS GRANTED U.S. PATENT №. 268,503 FOR HIS INVENTION OF "AN IMPROVEMENT TO BUILDINGS". TWO OTHER ELEPHANT STRUCTURES WERE CONSTRUCTED ALONG THE EAST COAST BUT HAVE NOT SURVIVED. NICKNAMED "LUCY" CIRCA 1887, THE BUILDING HAS SERVED AS AN OFFICE, A TAVERN, A RESIDENCE AND A TOURIST CURIOSITY, SURVIVING MANY STORMS. A HURRICANE IN 1903 UNDERMINED THE STRUCTURE, NECESSITATING ITS RELOCATION ABOUT FIFTY FEET FARTHER FROM THE SHORE. SAVED FROM DEMOLITION IN 1969 BY THE SAVE LUCY COMMITTEE, INC., SHE WAS DONATED TO MARGATE CITY AND MOVED TO A CITY PARK TWO BLOCKS DOWN THE BEACH. INCLUDED ON THE NATIONAL REGISTER OF HISTORIC SITES, "LUCY" IS CURRENTLY UNDERGOING RESTORATION.

THESE DRAWINGS WERE PREPARED FOR THE SAVE LUCY COMMITTEE, INC. BY THE RESTORATION ARCHITECT JOHN D. MILNER AIA, WEST CHESTER, PENNSYLVANIA. THEY REPRESENT LUCY AS A COMPILATION OF ORIGINAL AND RESTORED FABRIC. MEASURED 1969 - 1975 AND DRAWN IN JANUARY, 1976 UNDER THE DIRECTION OF JOHN D. MILNER, PRINCIPAL, AND ROBERT L. DESILETS, ARCHITECT, BY JEFFREY C. BOURKE, CHARLES DU PONT AND BENJAMIN WALBERT.

LOCATION MAP: 0 50 100 200 300 500 FEET

REGIONAL MAP: 0 5 10 20 30 50 MILES

DRAWN BY: JEFFREY C. BOURKE 1976

PREPARED FOR THE
SAVE LUCY COMMITTEE, INCORPORATED
BY JOHN D. MILNER AIA ARCHITECT
UNDER DIRECTION OF THE NATIONAL PARK SERVICE,
UNITED STATES DEPARTMENT OF THE INTERIOR

NAME AND LOCATION OF STRUCTURE
LUCY THE MARGATE ELEPHANT
ATLANTIC AVENUE & DECATUR STREET, MARGATE, ATLANTIC COUNTY, NEW JERSEY

SURVEY NO.

HISTORIC AMERICAN
BUILDINGS SURVEY
SHEET 1 OF 4 SHEETS

LIBRARY OF CONGRESS
HABS NUMBER

7. Description

CONDITION	*(Check One)*					
	☐ Excellent	☒ Good	☐ Fair	☐ Deteriorated	☐ Ruins	☐ Unexposed
	(Check One)			*(Check One)*		
	☐ Altered	☒ Unaltered		☐ Moved	☒ Original Site	

DESCRIBE THE PRESENT AND ORIGINAL *(if known)* PHYSICAL APPEARANCE

The Absecon Lighthouse was built in 1856 by the United States Government at the northern end of Absecon Island, now Atlantic City. It was built of iron and brick and towers 171 feet above the ground. It is circular measuring 27 feet in diameter at the base and 13' 7½" at the lens chamber. An iron spiral staircase extends from the base to the lens chamber. Iron frames with large, rectangular glass panes support a 12 sided pyramid roof. A catwalk at a storage level just below The lens provided the lightkeeper with a view of the inlet.

The light was installed in the lighthouse in 1857. It was fired by mineral oil and intensified by a "Fresnel lens of the first order". It was replaced in 1910 by an incandescent oil vapor lamp and in 1925 by electricity.

The lighthouse was decommissioned in 1933. Originally there was a keepers house, an assistant keepers house and an oil house on the property. These are shown in early photographs, but were greatly remodeled and torn down before the property was deeded to the State.

The lighthouse which was built near the inlet in an area where there were few houses is now one mile from the same inlet in a totally built-up area.

SEE INSTRUCTIONS

8. Statement of Significance

PERIOD *(Check One or More as Appropriate)*

☐ Pre-Columbian
☐ 15th Century
☐ 16th Century
☐ 17th Century
☐ 18th Century
☒ 19th Century
☒ 20th Century

SPECIFIC DATE(S) *(If Applicable and Known)* 1856 - (1933 decommissioned)

AREAS OF SIGNIFICANCE *(Check One or More as Appropriate)*

Aboriginal
  ☐ Prehistoric
  ☐ Historic
☐ Agriculture
☒ Architecture
☐ Art
☐ Commerce
☒ Communications
☐ Conservation
☐ Education
☐ Engineering
☐ Industry
☐ Invention
☐ Landscape Architecture
☐ Literature
☐ Military
☐ Music
☐ Political
☐ Religion/Philosophy
☐ Science
☐ Sculpture
☐ Social/Humanitarian
☐ Theater
☒ Transportation
☐ Urban Planning
☒ Other *(Specify)* nautical

STATEMENT OF SIGNIFICANCE

The Absecon Lighthouse is significant for navigational history and for it architecture. The building was erected in 1856 under the direction of Lt. George Meade, later commander of Union forces at Gettysburg. It served mariners along the coast from 1857 until 1933. It was erected as one of several lighhouses extending from Sandy Hook to Cape May. Its beacon, visible for 20 miles, provided a measure of safety to ships engaged in coastal trade and to yachtsmen searching for the inlet.

Prior to being built several ships and well over a thousand people perished along the shoal area of Brigantine Beach and Atlantic City.

The building, discribed in the preceeding physical appearance has Historic American Building's Survey status for the lighthouse structures. The keepers dwelling was demolished before drawings were made of that structure.

Today there is a small museum in a new building erected at the base. It is opened to the public during Atlantic City's tourist season, May through September.

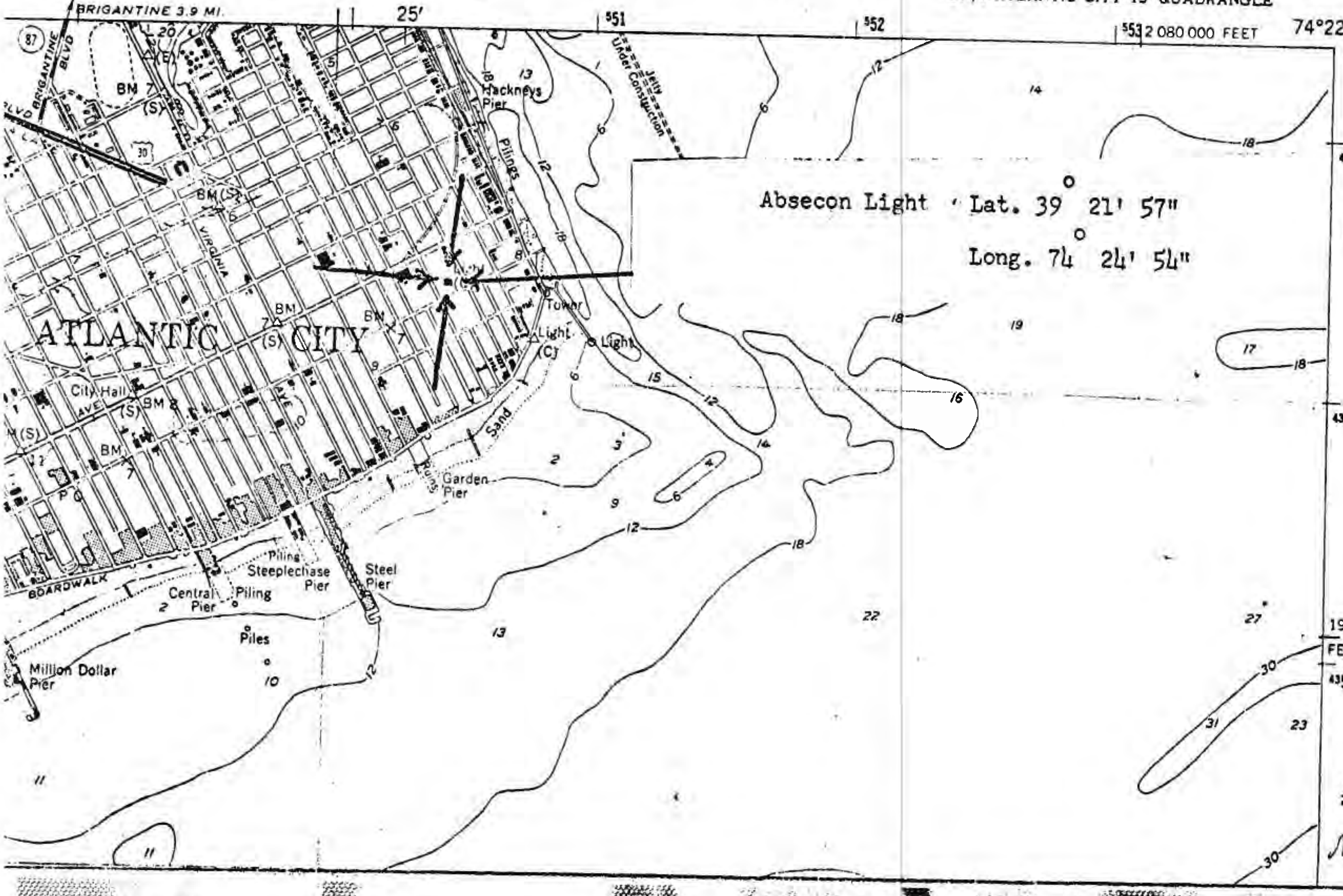
SEE INSTRUCTIONS

TES
OMMERCE
C SURVEY

ATLANTIC CITY QUADRANGLE

NEW JERSEY—ATLANTIC CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
SW/4 ATLANTIC CITY 15' QUADRANGLE

6162 IV NE
(BRIGANTINE INLET)



Absecon Light Lat. 39° 21' 57"
Long. 74° 24' 54"

ABSECON LIGHT

H3
Zn18
E 550 470
N 4357 370

7. Description

Condition		**Check one**	**Check one**
____ excellent	____ deteriorated	____ unaltered	_X_ original site
_X_ good	____ ruins	_X_ altered	____ moved date ____________
____ fair	____ unexposed		

Describe the present and original (if known) physical appearance

The Atlantic City Convention Hall, a vast 650-foot by 350-foot structure built in 1926-29, provides a dramatic focus on the Boardwalk at a significant bend in the beachfront.[1] It draws attention partly because of the great curving limestone exedra that curves out toward the beach and emphasizes the entrance of the Hall. Within, behind the massive pylons of the entrance, looms the great arched volume of the auditorium. Thus, the building really exists in two parts, unified by materials, function, and scale: the exedra with the covered curving double row of columns terminated by public bath houses, and the 2-story, limestone-clad front block of Convention Hall, backed by the immense brick-clad arched volume of the main hall. The main building contains the Great Hall, or Auditorium, large ballroom, and smaller public rooms.

Detailed Description

The exedra and public facade of the hall are both constructed in cut limestone. Their detail draws on the then-popular Lombard Romanesque, with elements of Neo-Assyrian design, especially in the capitals of the main arcade. That fusion of architectural styles no doubt occurred because both styles were being rediscovered by historians in the 1920s. The "First Romanesque Style" was the subject of volumes by Arthur Kingsley Porter and the Spaniard Puig y Chadafach, while the Assyrian archeological finds made by the British Museum were much noted in the popular press.

The Boardwalk-beach edge is appropriately ocean-oriented, with decoration, like that of contemporary Atlantic City hotels, using forms of ocean flora and fauna. Stone seahorses, porpoises, shells, and crustaceans are set into panels on the upper surfaces. The architectural forms are somewhat Mediterranean, with tile roofs, shallow corbels, and stylized Ravennate basket capitals similar to Italian 9th- and 10th-century Romanesque. At the corners of the site, just beyond the east and west walls of the facade, are public bath houses, small 3 x 5 bay rectangular limestone-clad buildings which are narrower on the north and south fronts. Shallow relief panels are set above their lintels, while corbel tables and tile roof edges crown their walls.

A short gap along the edge of the Boardwalk separates the rest rooms from the cubic baldachini that terminate the exedra. The latter are great piers that terminate the upper facade of the hall, bringing its overwhelming scale down onto the beachfront. Four square stone shafts carry an entablature that is capped by a series of stepped flat plates of stone. From the baldachini, the exedra curves out toward the ocean, then back toward the Boardwalk. It continues the entablature at the same level while the interior is clad with Gustavino tile; these are the same materials originally used in the vaulted entrance of the hall.

The front of the Convention Hall follows a Beaux Arts monumental scheme, again with Lombard Romanesque detail. A multi-story arcade above the broad Boardwalk entrance is flanked by tall pylons. The lower 3-story-high blocks, flanking the main block, contain shops on the first floor and offices and conference rooms on the second and third. The stone is coursed in regular, alternating wide and narrow bands, of a sort associated with Neo-Romanesque style in the 1890s. Pronounced variations in the color and tone of the limestone form an overall pattern.

The Beaux Arts rhythm, of lower end wings, terminating towers, and central arcade block, contrasts with the secondary patterns of Lombard Romanesque, in a smaller decorative scale. A corbel table supporting a string course sets off the openings of the first floor from the fenestrated and arcaded second floor; it is repeated again below the tile roof edge across the upper levels. Heraldic shields of the State of New Jersey are flanked by porpoises and seahorses above the doors in the towers and over the broad Boardwalk entrance, while a great frieze of sea fauna caps the towers.

This facade remains essentially intact, although the original architects modified it at the time of the Democratic National Convention in 1964. They walled in the large window openings of the second-floor gallery and removed the store fronts to the sides of the main entrance, as well as the doors in the towers. The original Boardwalk entrance was also modernized. Grained marble column covers and blue tile were placed on the wall, below a new stainless steel canopy, leading into a modernized foyer.

Behind the cut-stone front block, the main bulk of the building is sheathed in variegated yellow brick laid in decorative patterns, panels, and diaperwork. Massive piers along Georgia and Mississippi Avenues mark the great structural arches of the interior. Blind arcades along the side again recall the Lombard Romanesque. Bullseye windows and corbel tables fill the walls below the tiles of the roof edge, and limestone continues the color of the front on the upper surfaces of spur buttresses on the pier caps along the sides.

The same large rhythm of piers, infilled with brick wall panels, marks the north, or stage house, end. There the tall central volume, flanked by lower side wings, recalls the front composition. The street level is again detailed with limestone pier caps. Light-toned brick with limestone-colored concrete piers was carried on to the west wall.

The vestibule that connected the Hall to the Boardwalk was designed to be an immense vaulted passageway 50 feet wide, linking the beach and the Convention Hall and of sufficient size to permit the floats of Boardwalk pageants to be driven directly into the Auditorium for judges to view. It was sheathed in limestone, with a shallow Gustavino tile vault (resembling the outdoor exedra). The vestibule led to great sloping ramps to the upper levels and the front Ballroom and, through a low entrance, to the Great Hall itself. This vestibule was also modified in 1964.

The front Ballroom occupies a space behind the front loggia, or promenade, which is 12 feet wide by 185 feet long. Its axis runs across that of the main building to form a rectangular room 185 feet by 130 feet. A coved cornice leads to a central border, containing lights and speakers, that sets off a central flat panel raised above ventilation grills. The central panel is richly painted with clouds opening around square gold panels containing the signs of the zodiac, from which reach golden rays from the sun in the center. An organ balcony on the north wall, framed by three large arches, rests on capitals carved with seahorses. Though altered by new paint colors, stainless steel doors on the north side, and closed off from the balcony, the room remains an important Art Deco space. (Its original character is being restored.)

The extraordinary Great Hall is still one of the world's largest interior spaces, more than half a century after its completion. Its great roof gives the building its characteristic shape. It takes its form from the ten pairs of immense three-hinged arch roof trusses spanning its full 350-foot width. They recall the shape of the great railroad train sheds on which they were modelled. The result is a room 300 feet wide by 480 feet long, seating 30,000 on the floor, and surrounded on three sides by a mezzanine that seats another 10,000.

The Great Hall focuses on a handsome proscenium arch, flanked by eagle-capped pilasters. They frame the stage, which is alone 110 feet wide and 85 feet deep, at the north end of the building. The room survives nearly intact, with its original Art Deco decorative schemes still visible. Instead of primary tones, Lockwood and Greene used a color scheme based on secondary tones: sea foam green on the pilasters, accented by bright blue trim which continues along the triple arches of the side arcades. There, the emblems of all the States emphasize the theme of Atlantic City as a national resort. The whole space is covered by the massive steel arches, which are infilled with a continuous web covered by an early attempt at acoustic sound-absorbent material, painted a dull silver that sheds a metallic gleam.

The pipe organ of the Great Hall contains some 33,000 pipes in 8 chambers. These are placed:

> one on either side of the stage in the same plane, separated by 175 feet, two spaced along each side wall between the seating gallery and the ceiling vault, and two high in the ceiling itself, close to the middle of the auditorium. It is as if the listener were inside the instrument, surrounded by sound which not only issues from two positions in every quadrant for anyone stationed forward of the middle chambers, but echoes and reverberates from everywhere else. Even visually, it is not an "object." One sees only grills flush with the room surfaces; there are no display pipes.[2]

The ancillary spaces off the Great Hall are almost plain by contrast to it; imitation red granite wainscotting, set off by dark borders, accents the long ramps to the mezzanine and the upstairs corridors. The walls and ceilings in the corridors, small conference rooms, and dressing rooms are painted plaster. Stairwells that lead to the side exits on the major axes follow the detail of the public areas, with the imitation granite wainscotting. The metalwork is painted the dull silver of the main hall.

In general, the Convention Hall is in excellent condition, with alterations only minimally detracting from the great structure. The principal changes have occurred on the sides, where recent construction has obscured much of the side walls. In 1964, the original architects, Lockwood and Greene, were called back to erect a large, single-story, columned exhibition hall connected by doors and an escalator to the major levels of the Convention Hall. Its exterior of concrete and block construction recalls the monumental scale of the original building, but in different materials. Though it serves an allied purpose and functions together with the original hall as one of the East Coast's premier convention facilities, the new hall is separated by deed. (Only the original hall and exedra are included in this nomination.)

While the new hall is adjacent to the original hall, it only conceals the lower portion of the west side, leaving the hall's two major facades intact. More recently, the Trump Casino has been constructed abutting the east wall of Convention Hall.

A major restoration and rehabilitation of the Convention Hall began in 1983, and should be complete in 1985.[3] The Great Hall and Grand Ballroom are being carefully restored; the entrances from the ballroom onto the loggia will be reopened, as will the arcaded shopping area beneath it. A new main lobby will replace the vestibule area modified in 1964.

Footnotes

[1] This description is an edited and condensed version of the description contained in the draft National Register of Historic Places nomination form, prepared by Dr. George E. Thomas of the Clio Group, Inc., for the Atlantic City Convention Center Authority in 1983.

[2] David Fuller, "Atlantic City and the Ideal Organ," The American Organist, 19, 11 (November 1985), p. 74.

[3] Atlantic City Convention Center Authority, "Atlantic City Convention Center, the Second Renaissance Begins" (Atlantic City: Atlantic City Convention Center Authority, 1985), unpaginated. (Pamphlet.)

8. Significance

Period

___ prehistoric
___ 1400–1499
___ 1500–1599
___ 1600–1699
___ 1700–1799
___ 1800–1899
X 1900–

Areas of Significance—Check and justify below

___ archeology-prehistoric
___ archeology-historic
___ agriculture
___ architecture
___ art
___ commerce
___ communications

___ community planning
___ conservation
___ economics
___ education
X engineering
___ exploration/settlement
___ industry
___ invention

___ landscape architecture
___ law
___ literature
___ military
___ music
___ philosophy
___ politics/government

___ religion
___ science
___ sculpture
___ social/humanitarian
___ theater
___ transportation
X other (specify) (recreation - pageantry, sports)

Specific dates 1926-1929; 1964 **Builder/Architect** Lockwood-Greene & Co.

Statement of Significance (in one paragraph)

Atlantic City introduced a number of elements to American seaside amusements before beauty pageants, including the Boardwalk (1870), the amusement pier (1882), the rolling chair (1884), and the American picture postcard (imported from Germany) (1895). Even in the first decades of the 20th century, it also featured fine hotels.[1]

The present Boardwalk is concrete. All of the storied amusement piers have been destroyed or modified beyond recognition. The leading hotels from early in the century have been demolished. Only one major edifice remains that recalls the city's heyday as a seaside resort: the Atlantic City Convention Hall. This structure is also the scene of one of America's greatest pageants, the Miss America Contest.

The Atlantic City Convention Hall is the largest structure on the Atlantic City Boardwalk.[2] Its construction in 1926 marked the coming of age of "The World's Play Ground," as the nation's most popular resort dubbed itself; it culminated a half-century of development that created the Boardwalk, lined with great hotels. The city became the center of many of America's most popular folk events, beginning with the Easter Parade, and crowned in the 1920s with the public relations coup of the Miss America Pageant. More than half a century after its completion by architects Lockwood and Greene, the Hall continues to serve its original use as a convention center. It is also of interest for its size and engineering.

As engineering, the Atlantic City Convention Hall occupies a significant place in the history of large-span structures. Indeed, when it was built, it contained the largest room with an unobstructed view in the history of architecture. That feat was accomplished by the use of an architectural form developed for railroad train sheds, the three-hinged arched truss. The form had already been used for a similar exhibition purpose, in the Hall of Machinery of the Paris Exhibition of 1888, but it had not been used in a public auditorium. The engineering triumph of building so vast a hall on the seashore site resulted, on its 50th anniversary, in its being the recipient of the Civil Engineering Landmark designation of the American Society of Civil Engineers.

Atlantic City Convention Hall is also highly regarded by connoisseurs of American pipe organs, for it features what is, arguably, the largest organ in the world, with 33,000 pipes, arranged in chambers built into the walls of the Great Hall.[3]

History

The Atlantic City Convention Hall opened in 1929, on the 75th anniversary of the founding, by the directors of the Pennsylvania Railroad, of the city, which began as a speculative resort on Absecon Island. The role of the building in local history is clear from its position on the Boardwalk, the seaside boulevard that set Atlantic City apart from other American cities, and near the railroad stations, built by the capitalists who established the community.

The building was first proposed in 1926 when the Atlantic City beachfront was at its peak of popularity. In that year, architects Lockwood and Greene of Boston and New York were selected to design it because of their experience with long-span structures. They were charged by Mayor Edward Bader to build "the world's largest auditorium," as befitting "The World's Play Ground." When completed in 1929, the Hall was the world's largest auditorium and had the largest permanent span 3-hinged roof arch system ever built.

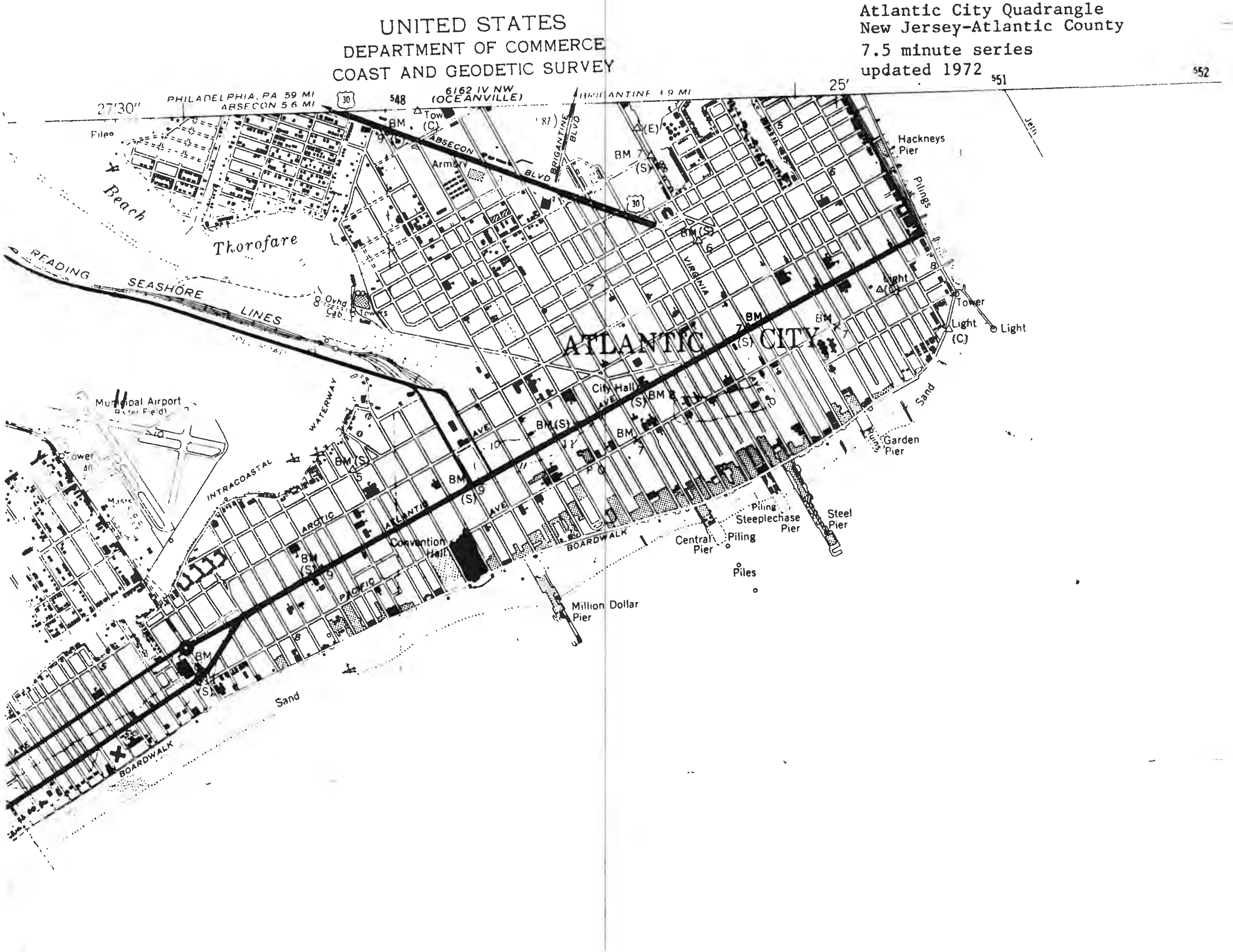
The Great Hall of the Convention Center was multi-purpose from the start. It has been transformed alternately into an ice-skating rink, a football gridiron, a polo and horse-show field and a steeplechase course; the ice-skating rink (90 feet by 200 feet) and one of the world's largest pipe organs were built into the structure.

The Hall was dedicated on the traditional weekend of the opening of the summer season, on May 31, 1929, exactly 75 years after the first train steamed into newly laid out Atlantic City. The event was attended by luminaries who included the Vice President of the United States Charles F. Curtis and the Ambassadors of the United Kingdom and Spain.

Atlantic City Convention Hall still holds national interest as the site of the typically American and much copied beauty pageant, the "Miss America" Contest. Though Bert Parks and the song "Here She Comes, Miss America" are part of the past, the Convention Hall has, since its completion, been the traditional scene of the event, now more than 60 years old. The first pageant was held in 1921; the following year that great recorder of Americana, Norman Rockwell, was one of the judges. By the early 1930s, the event had been invested with such significance by the media that Mayor Charles White boasted: "This is a cultural event seeking a high type of beauty. Atlantic City has a keen interest in the way of art, beauty and culture."

The hall has also been used for other nationally important events. For example, the Democratic National Convention of 1964, at which Lyndon B. Johnson and Hubert H. Humphrey were nominated for President and Vice President, respectively, was held there. The hall continues as one of the Nation's principal convention centers. That position has been enhanced in the 1980s, as Atlantic City's casino boom has brought revived prosperity to the city.

Atlantic City Quadrangle
New Jersey-Atlantic County
7.5 minute series
updated 1972



TYPE:
☐ New District
☑ Individually Eligible
☐ Individual and Contributing
☐ Contributing Only

☐ Mapped
USGS Quad Name Atlantic
Quad Reference Number 35
Digital Identification Number

ELIGIBLE PROPERTY WORKSHEET

Name The ~~Stand~~ Strand & Marine Apartments A.K.A.

Address /Location 3821 - 3825 Boardwalk Ave

Block / Lot /

County and Municipality Atlantic City - Atlantic County

District (If applicable)

☒ SHPO OPINION ☐ DOE ☐ COE ☐ ITC (HPCA-Part 1)

DATE SIGNED 7/30/08 CHRONO G08-261 PROD LOG 08-0941-1 AUTHOR DS

REPORT (Accession Number)

SURVEY FORM# (Historic Sites Inventory, Historic Bridge Survey)

Enclosure Checklist

- ✓ SHPO Signed Document
- NPS Signed Document
- ✓ Report Information (Title Page, Photograph copies, Relevant Sections)
- ✓ Property Information (Survey forms)
- ✓ Photographs (Historic and Current)
- HABS/HAER documentation
- ✓ Maps (Copy of Historic Properties USGS Quad, Historic, Tax)
- Other

PROJECT FILE NAME

CABINET LOCATION OF FILE

COVENANT / AGREEMENT

STATUS OF THE PROPERTY

Prepared by: Stamer Date: 8/29/08

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Natural and Historic Resources, Historic Preservation Office
PO Box 404, Trenton, NJ 08625
TEL: (609) 292-2023 FAX: (609) 984-0578
www.state.nj.us/dep/hpo

JON S. CORZINE
Governor

LISA P. JACKSON
Commissioner

July 30, 2008
HPO-G2008-261 PROD
08-0941-1

MEMORANDUM

TO: Janet Stewart, Project Review Officer
Land Use Regulation

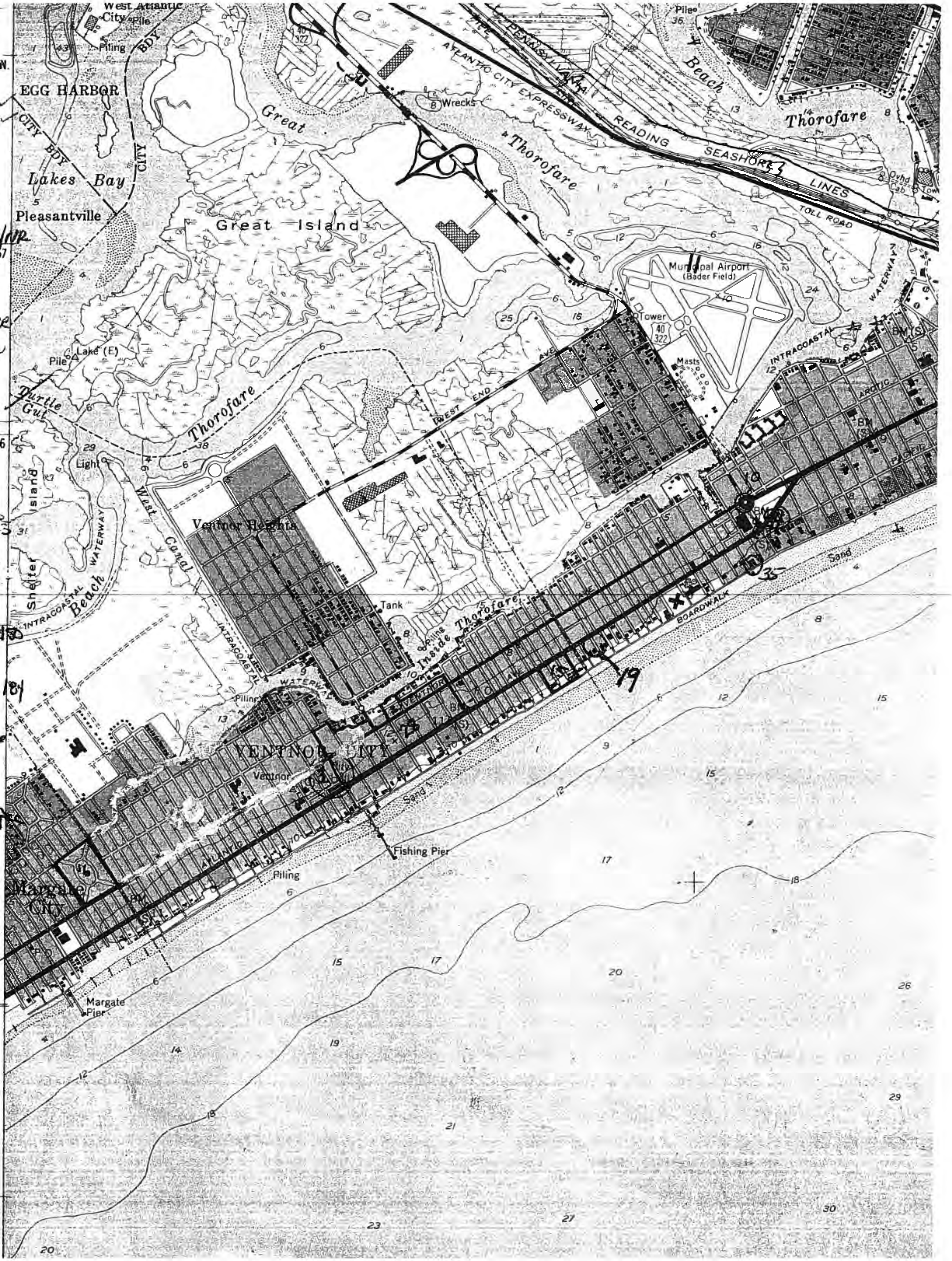
FROM: Terry Karschner, Acting Administrator
Historic Preservation Office

PROJECT: **Atlantic County, Atlantic City**
Atlantic Beach Hotel and Casino, Albany Avenue and the Boardwalk
Blocks 18, 19, 20, 21, 189 and
Block 157 Lots 1, 2, 3, 5
LUR file #0102-08-0002.1

Summary: The project is located adjacent to the New Jersey Register listed World War I Memorial. The proposed move of the WW I Memorial has been reviewed and approved by the Department pursuant to the New Jersey Register of Historic Places Act.

The Knife and Fork Restaurant, 29 S. Albany Avenue, is a significant example of the relatively rare Flemish Revival Style, and is an important landmark in Atlantic City. This **new SHPO Opinion** finds the Knife and Fork Restaurant to be eligible for listing on the National Register of Historic Places under Criterion C. The project includes the move of the Knife and Fork Restaurant to a new location.

The Marine Apartments, 3821 Boardwalk, and the Stand Apartments 3825 Boardwalk, are increasingly rare surviving examples of the architecturally designed apartments that were once common in Atlantic City. This **new SHPO Opinion** finds the Marine and Strand Apartments to be eligible for listing on the National Register of Historic Properties under Criterion C at the local level of significance.


West Atlantic City
Pile
Piling
BDY
EGG HARBOR
CITY BDY
CITY
Lakes Bay
Pleasantville
Great Thorofare
Great Island
Wrecks
ATLANTIC CITY EXPRESSWAY
PENNSYLVANIA
READING SEASHORE LINES
TOLL ROAD
Beach Thorofare
40
322
Ovhd Cab
Municipal Airport
(Bader Field)
Tower
Masts
INTRACOASTAL WATERWAY
ARCTIC
PACIFIC
BM
Pile
Lake (E)
Turtle Gut
Thorofare
WEST END AVE
Light
West Canal
Shelter Island
INTRACOASTAL WATERWAY
Beach
Ventnor Heights
Tank
Inside Thorofare
Piling
BOARDWALK
Sand
VENTNOR AVE
VENTNOR CITY
Ventnor
ATLANTIC
Fishing Pier
Piling
Margate City
Margate Pier
10
35
19
53
11
4357
4356
4355
4354
4352
3-18

PRELIMINARY HISTORIC ARCHITECTURAL AND ARCHAEOLOGICAL ASSESSMENT

GATEWAY PROJECT (OPTION 19)

ATLANTIC CITY, ATLANTIC COUNTY
NEW JERSEY

Prepared For:

Cape Advisors, Inc.

Prepared By:

Richard Hunter, Principal Investigator
William Liebeknecht, Principal Investigator
Charles H. Ashton, Principal Architectural Historian
Cheryl Hendry, Historian
Hunter Research, Inc.

and

Seth Hinshaw, Senior Preservation Planner
Wise Preservation Planning

MARCH 2008

MANAGEMENT SUMMARY

Hunter Research, Inc., under contract to Cape Advisors, Inc., has conducted a cultural resources study of all or part of six blocks in Atlantic City, New Jersey in advance of Cape Advisors' application for a permit under New Jersey's Coastal Area Facilities Review Act (CAFRA). The project as proposed would result in the construction of a casino and related structures and the reconfiguration of some streets.

These studies were intended to identify historic architectural resources within the project footprint that may be eligible for inclusion in the New Jersey and National Register of Historic Places; to identify foreseeable effects to any such properties; and to make appropriate recommendations to mitigate adverse effects, where warranted. Preliminary assessment of the project site's archaeological potential was also a goal of this study.

The project site and its vicinity were largely developed after the initial wave of construction in Atlantic City, about the last decade of the 19th century and later. The first buildings were related to railroad excursions serving patrons from Philadelphia, who would alight from their trains and spend the day at the "New Sea View Excursion House" attached to the railroad station. At this location, food, beach access, dancing and various other amusements were provided. In later decades, the project site was redeveloped with hotels, apartment buildings and other commercial buildings. One entire block would be occupied by the Atlantic City High School.

As a result of this investigation, the five surviving buildings over 50 years of age within the project footprint were intensively surveyed. Of these, the Knife & Fork on Albany Avenue and the Marine and Strand Apartments at the Boardwalk between Lincoln Place and Roosevelt Avenue were found to be potentially eligible for inclusion in the New Jersey and National Registers due to their architectural attributes. Since all three will be removed by the project (although the Knife & Fork is slated to be moved to a new site less than a block away), recording to the standards of the Historic American Buildings Survey prior to removal is recommended.

This same pattern of development and redevelopment has resulted in the site's archaeological potential being judged at from low to moderate. Monitoring of ground-disturbing activities in certain specified areas by a qualified archaeologist is therefore recommended.

To address the small zone of potential Native American and early historic archaeological interest, a limited geoarchaeological investigation is recommended, either as soil auger tests or borings accomplished in conjunction with project-related geotechnical studies or as a program of independent backhoe trenching If significant archaeological remains are identified in this section of the project site, some form of archaeological data recovery may be necessary to mitigate the effects of the project.

Immediately after the current road network was in place, the area was developed with apartments. By 1924, the block bounded by the Boardwalk, Lincoln Place, Atlantic Avenue and Roosevelt Place contained four apartment buildings – one unnamed building, the Roosevelt Apartments and the Marine and Neptune (now the Strand) Apartments. Two of these early apartment buildings are still standing: the Marine and Strand Apartments. These two apartment buildings were most likely built between 1923 and 1924 by the Lincoln Development Company, who owned the property from 1923 to 1925 (Atlantic County Deeds 727/181, 765/298 and 772/185). They first appear on Mueller's *Atlas of Absecon Island, New Jersey* (1924) and were most likely built after the Finance Company of New Jersey sold the property on February 8, 1923 (Figure 4.19). The Marine Apartments were known as such since their construction, but the Strand Apartments were originally called the Adriatic Court Apartments (R.L. Polk & Co. 1926). While Mueller's *Atlas* identifies the building as the "Neptune Apartments," city directories from that year place the Neptune Apartments at 132 Kentucky Avenue (R.L. Polk & Co. 1924). The first city directory to list the Marine and Strand/Adriatic Court Apartments was published in 1926, so it is likely that the first residents moved in after the Lincoln Development Company sold the property (R.L. Polk & Co. 1926).

Parts of the current project area were also commercially developed in the 1920s. The President Hotel was constructed in 1926 on the Boardwalk between Albany and Hartford Avenues (Plate 4.7). At a cost of $5 million, the President was envisioned as a destination for the rich and powerful. In fact, it was constructed with a top-floor "Presidential Suite," intended to be the summer White House for the nation's presidents. Calvin Coolidge was the first president to be invited to inhabit the Presidential Suite, but he declined, putting an end to the idea of the "summer White House" before it began (Funnell 1975:146).

The President Hotel however, would host other rich and powerful guests – Lucky Luciano, Al Capone, Nig Rosen and other notorious mobsters. Wanting to extend his network of organized crime, Lucky Luciano called for a national convention of the major racket bosses and Atlantic City seemed the perfect in which to meet. During the second week of May in 1929, mobsters from around the country descended on Atlantic City – their destination was the Breakers Hotel. When Al Capone and Nig Rosen were denied entrance to the hotel, the entire party headed for the President. All of the decisions involved in the birth of a national network of crime organizations were made that week and the President was home base (Johnson 2003:99-101).

Several restaurants opened in the project area in the 1920s as well. By 1929, the Neptune Inn provided competition to the still thriving Knife & Fork Inn. The Neptune Inn opened around 1929 on Pacific Avenue, directly across the street from the Knife & Fork. Though a postcard from *circa* 1962 claims that the "Neptune Inn was the first bank building in the United States to be converted into a Restaurant and Cocktail Lounge" there is no evidence that suggests a bank existed at this location (Postcard of Neptune Inn, Collection of Allen Pergament).

The project area witnessed tremendous growth in the 1920s and by the end of the decade it contained a mix of residential, commercial and civic structures. Two historic images dating to *circa* 1929 or 1930 -- a postcard intended to provide an aerial view of the city's new convention hall and an oblique aerial photograph taken from a "sea gull flying boat" — provide excellent visual coverage of the landscape (Plates 4.8 and 4.9). Chelsea Park, the World War Memorial, the High School and the President Hotel were focal points of the neighborhood, but smaller dwellings, apartment buildings and restaurants surrounded these prominent structures. Moreover, unlike the central part of

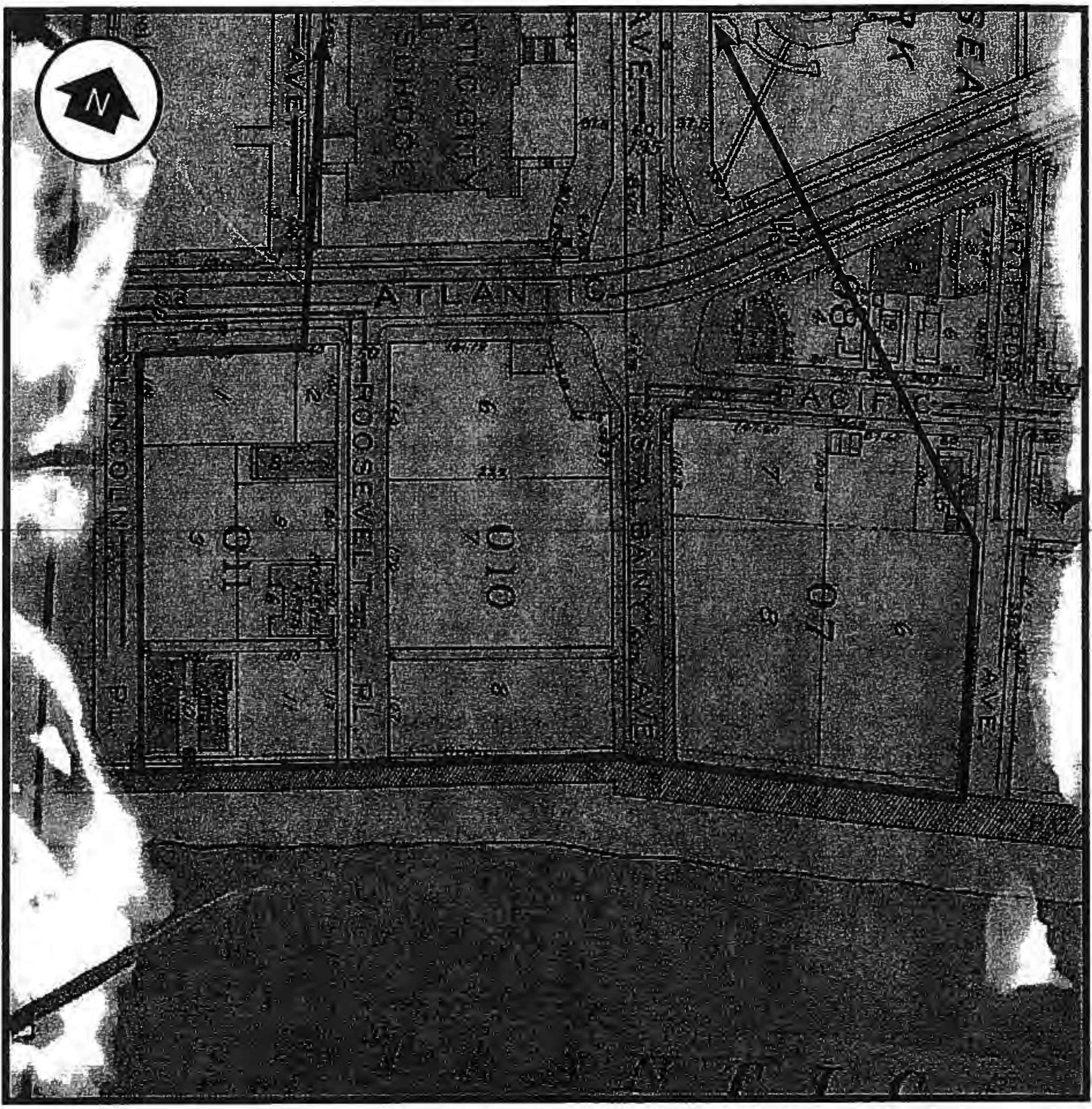


Figure 4.19a. Mueller, A.H. *Atlas of Absecon Island, New Jersey. Volume One, embracing the City of Atlantic City and the City of Brigantine.* 1924. Project Area Outlined. Scale: 1 inch= 200 feet (approximately).

Atlantic City in which nearly every lot was built upon, this area still contained a number of undeveloped lots. Surprisingly, several of these lots would be developed in the first years of the 1930s, in the midst of the Great Depression.

Four apartments were built on Lincoln Place between Atlantic Avenue and the Boardwalk between 1930 and 1931. Two of these buildings, 109 and 111 Lincoln Place are still standing. Herman M. Ellis purchased all four lots, which were then undeveloped, in 1930 for $300 (Atlantic County Deed 955/295). On February 20, 1931 he sold the lot at 111 Lincoln Place to the Royal Apartment Company of New Jersey for $12,500 (Atlantic County Deed 963/157). This significant increase in the property's value suggests that the apartment building that stands on the lot dates to this period. Ellis sold the lots at 105, 107 and 109 Lincoln Place to the Roselle Corporation on May 4, 1931 for $500. That corporation in turn sold 109 Lincoln Place to the Lincoln Building Company on June 15, 1931 for $14,000 (Atlantic County Deed 974/5). Again, the increase in the property's value is certainly indicative that this apartment too was built in 1931. Based on architectural evidence, the two buildings were likely designed and constructed by the same company, though each lot was under different ownership. The Franklin Survey Company's *Property Atlas of Absecon Island, N.J.* (1938) (Figures 4.20a-b) provides evidence that apartment buildings of similar size and form were built at 105 and 107 Lincoln Place at some point between 1931 and 1938 as well.

World War Two brought significant changes to Atlantic City as the United States military occupied much of the resort town from 1942 to 1946. The beach, boardwalk, Boardwalk Hall and even the roof of the President Hotel served as training facilities for soldiers and many of the resort's large hotels, including the President, were converted to barracks (Levi and Eisenberg 1979:107-110). In many of the hotels, "'Lobbies, mezzanines, dining rooms, halls and other parts of the hotels were stripped of rugs, carpets, draperies, and other adornments,' reported the *New York Times*. 'Over the concrete of the floors march thousands of leather-heeled recruits. Most bedroom furniture has been replaced by army equipment'" (quoted in Levi and Eisenberg 1979:111). The President, which was occupied by the AAF Redistribution Station No. 1 and the Army Ground and Service Forces beginning on August 7, 1942, did not return to private ownership until November 30, 1945 (Atlantic City Daily Press 1945, 1946).

With much of the city's resources occupied by the military and the war, very little changed in physical structure of the project area during the war years. In 1949, the structural landscape of the project area was nearly identical to what it was in 1938 (Figures 4.21a-c and Plate 4.10). Then next significant change to the area occurred in 1950 when four stores and a gas station on the south side of Atlantic Avenue between Albany Avenue and Roosevelt Place were demolished to make room for the Mayfair Apartments. Built in 1950, the twelve-story Mayfair Apartments occupied the entire southerly side of Atlantic Avenue between Albany Avenue and Roosevelt Place (Plates 4.11 and 4.12).

F. DEVELOPMENT AND DESTRUCTION SINCE 1958

Since 1958, the project area has gone through a series of large scale construction and demolition projects (Figures 4.23a-c). In 1959, the 137-unit President Motel was constructed to the southeast of the Mayfair Hotel on a lot that had previously been occupied by a small restaurant on Albany Avenue (Plates 4.13 and 4.14; Franklin Survey Company 1938; Sanborn Map Company 1952; Prendergast 1968). In the mid- to late 1960s, Roosevelt Beach Realty, Inc. built the Roosevelt

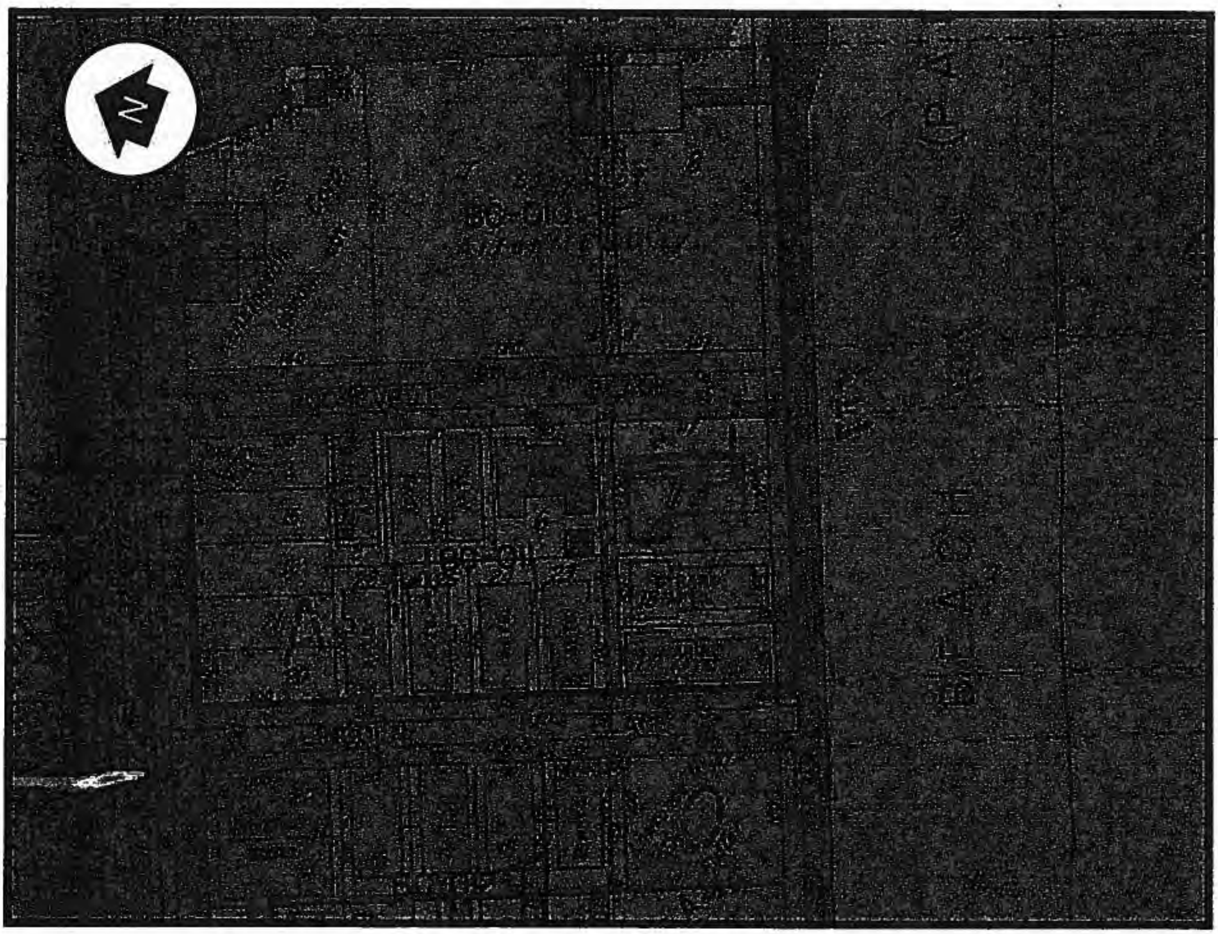


Figure 4.20a . Franklin Survey Company. *Property Atlas of Absecon Island, N.J., complete in one volume including Atlantic City, Ventnor, Margate City, Longport and Brigantine.* 1938. Project Area Outlined. Scale: 1 inch= 150 feet (approximately).

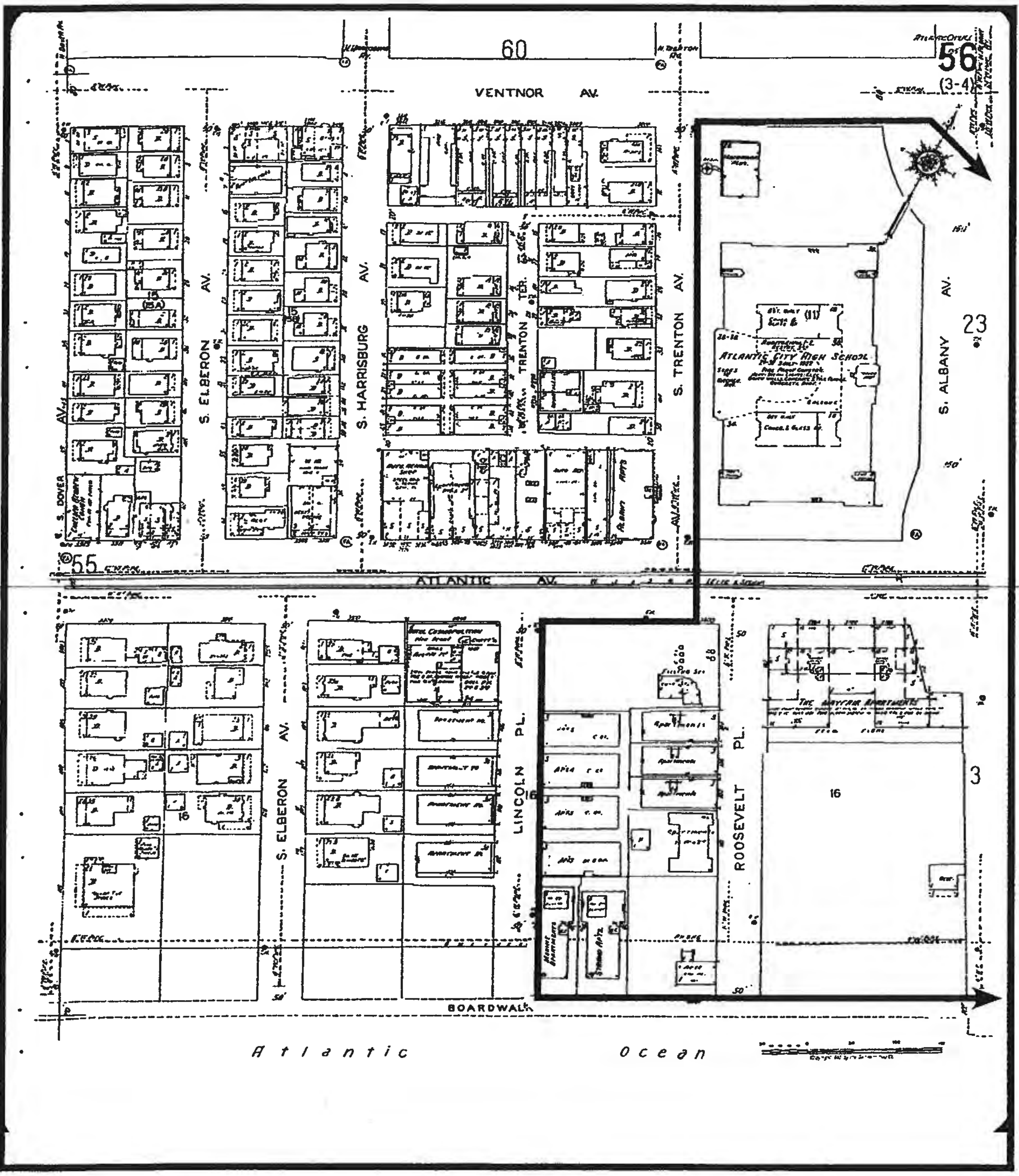


Figure 4.22c. Sanborn Map Company. *Insurance Maps of Atlantic City, New Jersey.* 1952. Project Area Outlined. Scale: 1 inch= 165 feet (approximately).

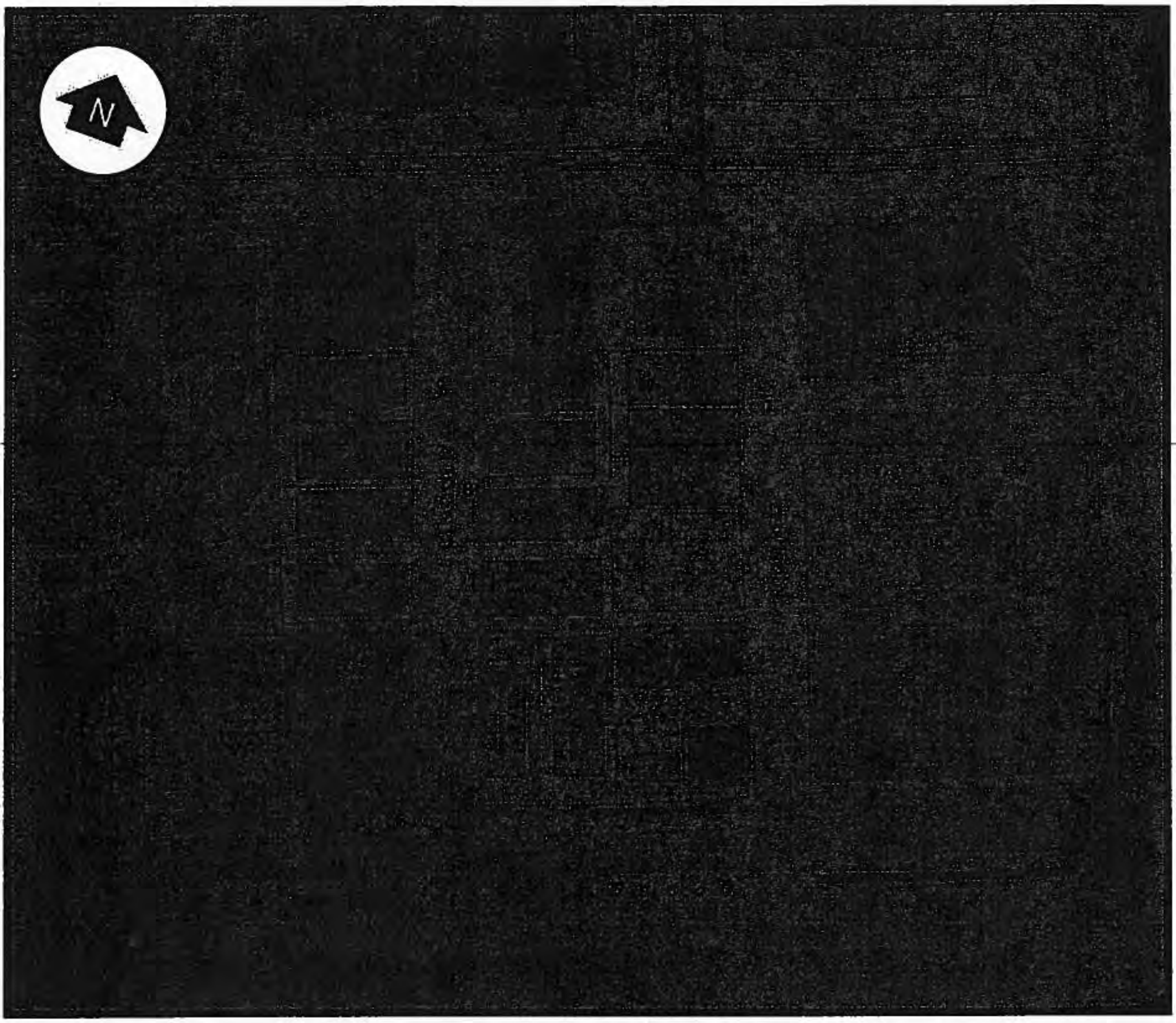


Figure 4.23a. Sanborn Map Company. *Insurance Maps of Atlantic City, New Jersey.* 1976. Project Area Outlined. Scale: 1 inch= 140 feet (approximately).

Motel on Block 19 Lot 3 to the northeast of the Strand and Marine Apartments on a lot formerly occupied by Junior's Luncheonette. Harold Zeltner and Maxwell Goldberg had built Junior's Luncheonette, a small cinder block building fronting on the Boardwalk, in 1951 or 1952 where it operated until 1962. By 1963, the lot was vacant (Atlantic County Deed 1544/174; R.L. Polk & Co. 1954, 1961, 1963).

In the 1970s, the combination of an economic upswing in Atlantic City and a shortage of luxury housing in the resort created a demand for condominium housing. The current project area, with several apartment buildings and motels located on prime beachfront property, was not immune from the growing trend toward condominium conversion (Binder 1979). In 1976, Harold Zeltner created the Roosevelt Beach Condominium Association and converted his 33 unit Roosevelt Beach Motel into condominiums (Figures 4.24a-b; Atlantic County Deed 3005/173). Three years later, the Costas Corporation, owner of both the Marine and Strand apartments, converted those two buildings into the Strand Marine Condominiums (Figures 4.25a-d; Atlantic County Deed 23413/59).

The advent of casino gambling in Atlantic City also resulted in great changes for the current project area. The blocks bounded by the Boardwalk, Roosevelt Place, Atlantic and Pacific Avenues and Hartford Avenue were the sites of two proposed casinos. In 1968 Friendship House Inc. purchased the President Hotel from the President Hotel of Atlantic City Corporation to convert it to an apartment building. However, ten years after the President was converted into apartments, then-owner Del E. Webb Company relocated the President's tenants and demolished the building to make way for a $100 million casino construction. The President was to be replaced by the Sahara Boardwalk, a 48,000 square foot casino and hotel, though this casino was never built and today a parking lot sits on the site of the former President Hotel (Prendergast 1968; Heneghan 1979; Schwartz 2006). In 1989, the Dunes Casino had been partially built on the site of the former Mayfair Apartments and President Motel. However, this project was never fully realized and a skeleton of the proposed building sat on the lot until 1991 when it was torn down (Plate 4.15; Schwartz 2006b).

Even the Atlantic City High School was not immune to casino construction. After the High School relocated to a new building on Great Island in 1994 the old building was demolished, and like the site of the President Hotel, now serves as a parking lot for Atlantic City (Plate 4.16).

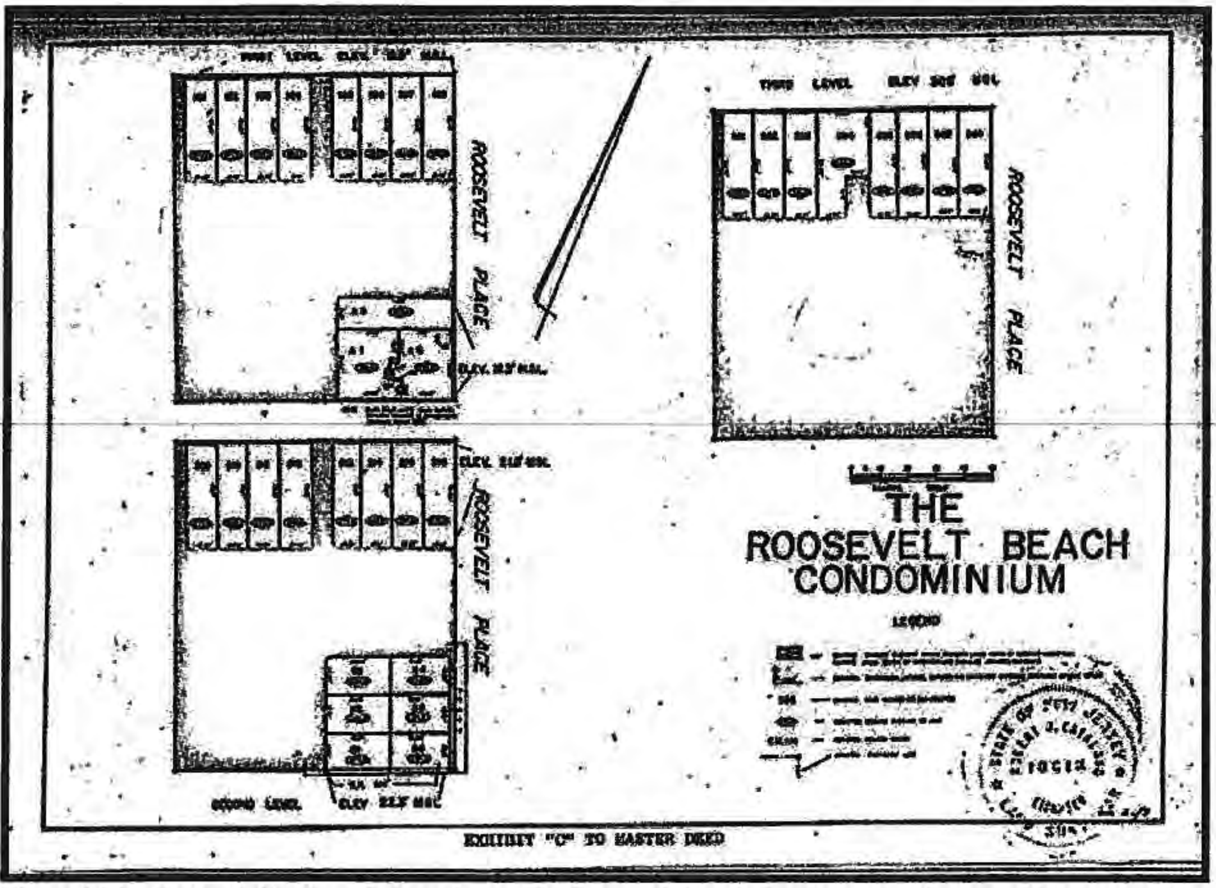


Figure 4.24a. Robert J. Catalono & Associates. *The Roosevelt Beach Condominium: Survey of Premises, Atlantic City, Atlantic County, N.J.* 1976. Source: Atlantic County Deed 3005/173. Scale as shown.

installed in 1929. The sculpture, entitled "Liberty in Distress," was the work of Frederick MacMonnies who also created the Revolutionary War battle monument in Princeton, New Jersey. In 1988 new lighting was installed and the memorial rededicated (Plates 5.2 and 5.3).

C. THE KNIFE & FORK

The Knife & Fork occupies the entire tax parcel except for portions of the surrounding side walk. Its design draws heavily on Flemish architecture rarely found in America. Major design elements include its stepped cross-gables, parapets, chimney, diamond-paned windows, and irregular shape. The building has an irregular footprint, made necessary by the intersection of the three roads on three sides. It has three large Flemish stepped cross-gables facing Atlantic Avenue and one such gable on the ends facing Atlantic and Pacific Avenues (Plate 5.4).

Though the present Knife & Fork was built in 1912, it stands on a piece of ground that has been home to an inn and restaurant since 1896 (Mueller 1896) (Figure 4.14). In fact, the name "Knife & Fork Inn" predates the current building by at least 4 years (C.E. Howe Company 1908). Some sources contend that former mayor William Riddle opened the inn as a saloon, or a private drinking club (Tyler 1997). When the current Knife & Fork building opened in 1912, the property was owned by the Mary A. Riddle Company of Pennsylvania who leased it to William Riddle (Atlantic County Deed 489/247; Atlantic City Press 1914) (Table 5.1). Mary A. Riddle was William Riddle's mother.

Accounts differ as to the fate of the inn's bar. According to one source, Riddle removed it during Prohibition; another states that the bar was in fact destroyed by federal agents who raided the Knife & Fork (Tyler 1997; Swavy 2002).

Milton Latz began leasing the Knife & Fork Inn from the Riddles as early as 1927. In 1944 the Riddles had suffered financial losses from a hurricane and though the Knife & Fork escaped unharmed, the Riddles put the property up for sale. Milton and Evalyn Latz purchased it outright (Atlantic County Deed 1220/27; Waltzer 2005). When Evalyn Latz died in 1968, the property passed to her sons, Mack and Jim. Mack bought his brother's share in 1986 and put the entire property up for sale in 1996. The property was not sold and Mack's son Andrew Latz reopened the Knife & Fork in 1999. He made minor changes to the interior of the building – removing carpet and restoring old wood floors – and while the new Knife & Fork Inn was successful, a family dispute caused it to close again.

During the Latzes' ownership the Knife & Fork was nationally prominent – it catered to celebrities, politicians and business men and was the setting for a scene from the film "Atlantic City" (starring Burt Lancaster and Susan Sarandon) in 1979 (Swavy 2002; Waltzer 2005).

In 2005, the Knife & Fork reopened after a change in ownership and a major six-month renovation. New owner Frank Dougherty removed "Inn" from the restaurant's name, transformed the glass-enclosed porch into a "sleek martini bar," installed a large window looking into the kitchen and planned to turn the old 3rd and 4th floor apartments into a wine cellar (LaBan 2005).

This local landmark appears to be eligible for the National Register of Historic Places. It is one of very few buildings incorporating Flemish architectural

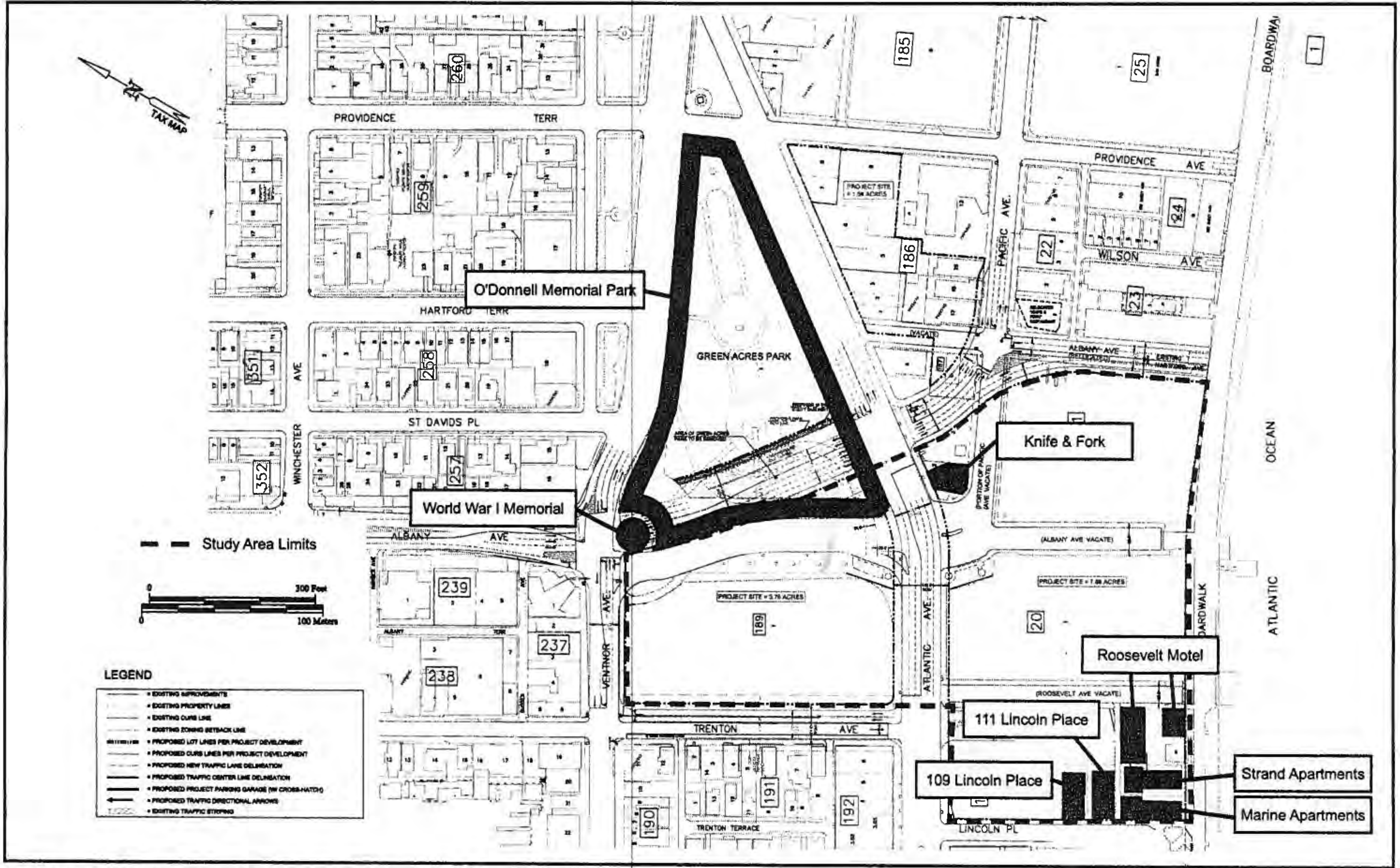


Figure 5.1. Tax Parcel Map Showing Project Site (outlined in blue) and Proposed Road Realignments in Relation to Historic Architectural Properties.

elements (mainly the stepped gables, fenestration and chimneys). Although the building has undergone alterations, particularly the enclosure of its porch on the front of the building, it appears to be significant under Criterion C for architecture in the context of northern European revival architecture.

D. THE MARINE AND STRAND APARTMENT BUILDINGS

Although two separate buildings on separate lots, the architectural form (and more importantly, history of ownership) of the two buildings is so similar that they are treated together (Plate 5.5). Both are five-story yellow brick veneer apartment buildings with cement trim, standing side by side on adjacent lots and separated by a small courtyard. The two structures were intensively surveyed separately (see Appendix C).

The Strand and Marine Apartments were most likely built in 1923 or 1924 by the Lincoln Development Company, who owned the property from 1923 to 1925 (Atlantic County Deeds 727/181, 765/298 and 772/185) (Table 5.2). The two buildings are nearly identical and were probably constructed at the same time. Both are brick buildings with a steel frame and with similar interior layouts. The buildings share a narrow cement courtyard. An alley forms the northwest border of the property. The original interior and exterior detailing are mainly intact.

The Marine Apartments first appear on Mueller's *Atlas of Absecon Island, New Jersey* (1924) (see Figure 4.19) and subsequent map evidence indicates that the size, form and use of the building remained unchanged into the 1970s.

An apartment building was definitely on the Strand site by March 19, 1925 when the Lincoln Development Company sold the lot "together with that certain apartment house thereon erected" (Atlantic County Deed 765/298) (Table 5.3). The Strand Apartments were originally known as the Adriatic Court Apartments (R.L. Polk & Co. 1926). While Mueller's *Atlas of Absecon Island, New Jersey* (1924) identifies the building as the "Neptune Apartments," city directories from that year place the Neptune Apartments at 132 Kentucky Avenue (R.L. Polk & Co. 1924). By 1938, the name of the apartment building had changed from Adriatic Court to Strand Apartments (R.L. Polk & Co. 1938). Subsequent map evidence indicates that the size, form and use of the building remained unchanged into the 1970s. In 1979, the Costas Corporation owned both the Marine and Strand Apartments and converted them into the Strand Marine Condominiums (Atlantic County Deed 23413/59).

The Strand and Marine apartments, particularly when evaluated together rather than as individual buildings, each appear to be eligible for the National Register of Historic Places. Both buildings incorporate distinctive design features on the interior and exterior that make them architecturally significant within the context of mid-rise apartment buildings. On the exterior, the ornamentation not only demonstrates the craftsmanship of the time, but gives the buildings a sense of Sullivanesque verticality and thus a commanding presence along the Boardwalk. This is particularly true when the buildings are considered as a pair. The interior plan of both buildings is similar, and incorporates several features that were specifically built to take advantage of the seaside location albeit on a small city lot. As such both buildings appear eligible under Criterion C for architecture.

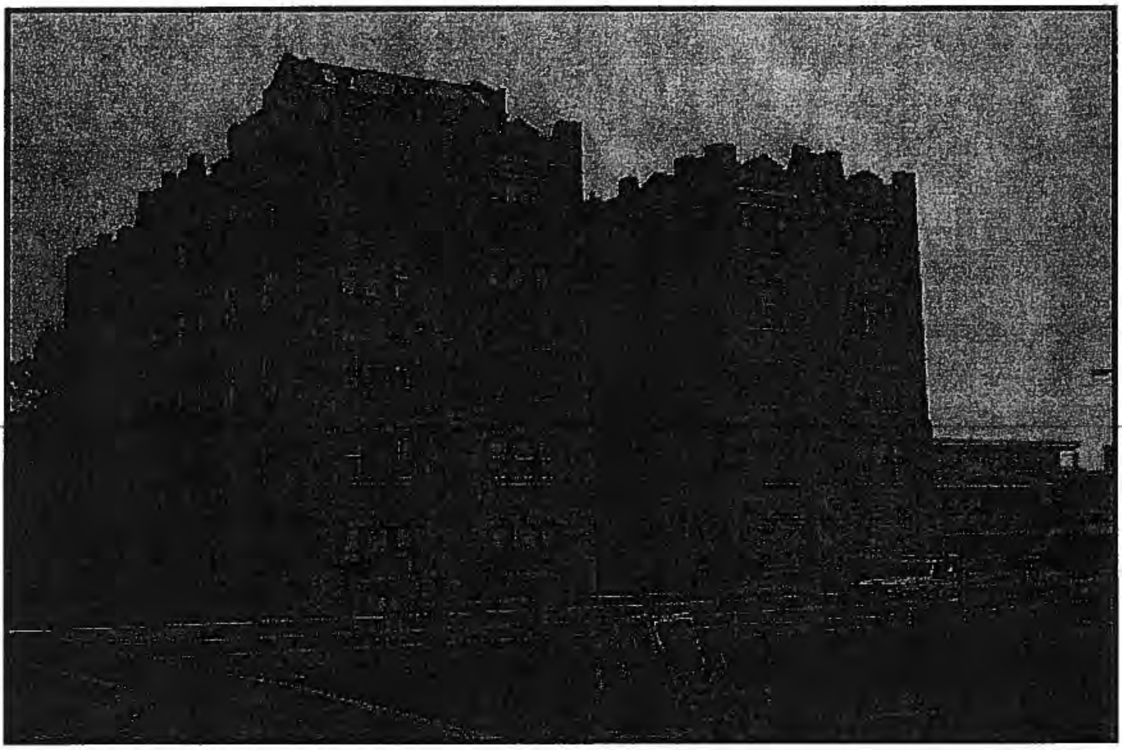


Plate 5.5. View generally west of the Marine (left) and Strand Apartments from the beach (Photographer: Charles Ashton, February 2008)[HRI Neg. #08011/D1:36].

Chapter 7

CONCLUSIONS AND RECOMMENDATIONS

A. HISTORIC ARCHITECTURAL RESOURCES

The intensive-level architectural survey of the project site identified three buildings that, in the opinion of this consultant, are eligible for inclusion in the New Jersey and National Registers of Historic Places. These are the Knife & Fork at 29 Albany Avenue, the Marine Apartments at 3821 Boardwalk and the Strand Apartments at 3825 Boardwalk. All three are deemed eligible on the basis of their architecture rather than for association with significant individuals or events. The removal of all three buildings is proposed under Option 19 as it now exists, thus carrying the potential to cause an adverse effect under the definition of that term quoted in Chapter 1.

Under Option 19 the Knife & Fork would be relocated about one block east on Pacific Avenue, to a site at the eastern corner of its intersection with Hartford Avenue. Prior to the relocation, the building should be recorded in its current (historic) location to the standards of the Historic American Buildings Survey (HABS). Such recording would typically include large-format photography of the building in its context, including general views and significant architectural details. Recording would also include preparation of a historical narrative with reproductions of historic photographs and maps as appropriate to illustrate its history. One full copy of the recording (with photographic negatives) should be filed with the New Jersey Historic Preservation Office. Archivally stable copies of the photographs and the narrative should also be made available to the Atlantic City Public Library and the Atlantic Heritage Center in Somers Point. Since the significance of the Knife & Fork is architectural, this treatment should adequately mitigate the adverse effect resulting from the project.

Under Option 19 both the Marine and Strand Apartments would be demolished. Unlike the Knife & Fork, relocation of these two five-story buildings is probably not feasible (although this question has not been addressed in the course of this investigation). However, like the Knife & Fork, their significance is architectural and the adverse effect could be mitigated by a program of photographic and written (narrative) recording to HABS standards as described above. Due to their similarities in ownership, history and particularly design, the two buildings could be recorded together, as a complex, rather than as two individual structures. The recording products should be distributed as in the case of the Knife & Fork.

Since none of the other three buildings in the project area—109 and 111 Lincoln Place and the Roosevelt Beach Motel—are considered eligible for inclusion in the New Jersey or National Registers of Historic Places, no mitigation is called for and no further work is recommended.

B. ARCHAEOLOGICAL RESOURCES

The majority of the project site has no archaeological potential. Mid- to late 20-century land use has been of sufficient intensity and scale that the construction of modern buildings, their subsequent demolition and infrastructure improvements will have removed most traces of Native American and historic occupation pre-dating the early 20th century.

Only in limited parts of the eastern and southwestern sections of the project site is there a low to moderate potential of archaeological remains surviving intact (Figure 6.1). In these areas, two approaches are recommended to clarify whether or not significant archaeological remains are present:

1. to address the small zone of potential Native American and early historic archaeological interest within the eastern part of Block 21, it is recommended that a limited geoarchaeological study be performed by a qualified geomorphologist and prehistorian to ascertain whether or not the underlying natural landform is of sufficient age and character to contain archaeological evidence from the period *circa* 3,000 B.C. to A.D. 1900. Such a study could take the form of soil auger tests or borings, which could be accomplished in conjunction with project-related geotechnical studies. Alternatively, a program of independent backhoe trenching could be carried out at the combined Phase I and II survey level, which would allow for a more thorough consideration of archaeological potential. If significant archaeological remains are identified in this section of the project site, some form of archaeological data recovery may be necessary to mitigate the effects of the project.

2. for those areas of the project site identified as holding a low to moderate potential for yielding late 19th- and early 20th-century archaeological remains (a small area in the center of Block 18; the northeastern corner of Block 21; the southwestern corner of Block 187, including the site of the Knife & Fork; and the southern corner of O'Donnell Memorial Park), archaeological monitoring during the ground preparation stage of construction is recommended. The goal of such monitoring would be to recover an artifact sample and record potentially valuable information about late 19th- and early 20th-century residential, commercial and resort-related land use in this rapidly developing section of Atlantic City.

Archaeological monitoring work should entail systematic observation by a qualified archaeologist of contractor excavations for the footings, landscaping and related elements of the new construction in areas where archaeological deposits of potential interest are suspected. The archaeological monitor should take notes, measurements and photographs, conduct limited recovery of artifacts as necessary, and record stratigraphy and features of particular historical and archaeological importance. The archaeological monitor should have the authority to halt work for brief periods to facilitate recording if stratigraphy or features of importance are noted.

Provision should also be made for the development of contingency plans for more intensive archaeological recording in the unlikely event that more significant archaeological resources are encountered than are presently anticipated. In this event, the New Jersey Historic Preservation Office should be contacted concerning the scope of any further archaeological work. Details of the archaeological monitoring program should be incorporated into the construction plans, specifications and contract documents to ensure that all parties involved in the construction process are aware of the project's obligations with reference to archaeological resources and respect the need for and the authority of the archaeological monitor during ground disturbing activities.

ATLANTIC CITY QUAD
27

A:\checklist
01/98

✓ Mapped on main USGS

SHPO Opinion Checklist

Property Name: WARNER THEATER

Location/Address: BOARDWALK

County/Municipality: ATLANTIC CITY

SHPO Opinion date: 1/9/96 Chrono # A96-61 Log File # 96-543

Information in this file includes:
(checkmark or fill in data where applicable)

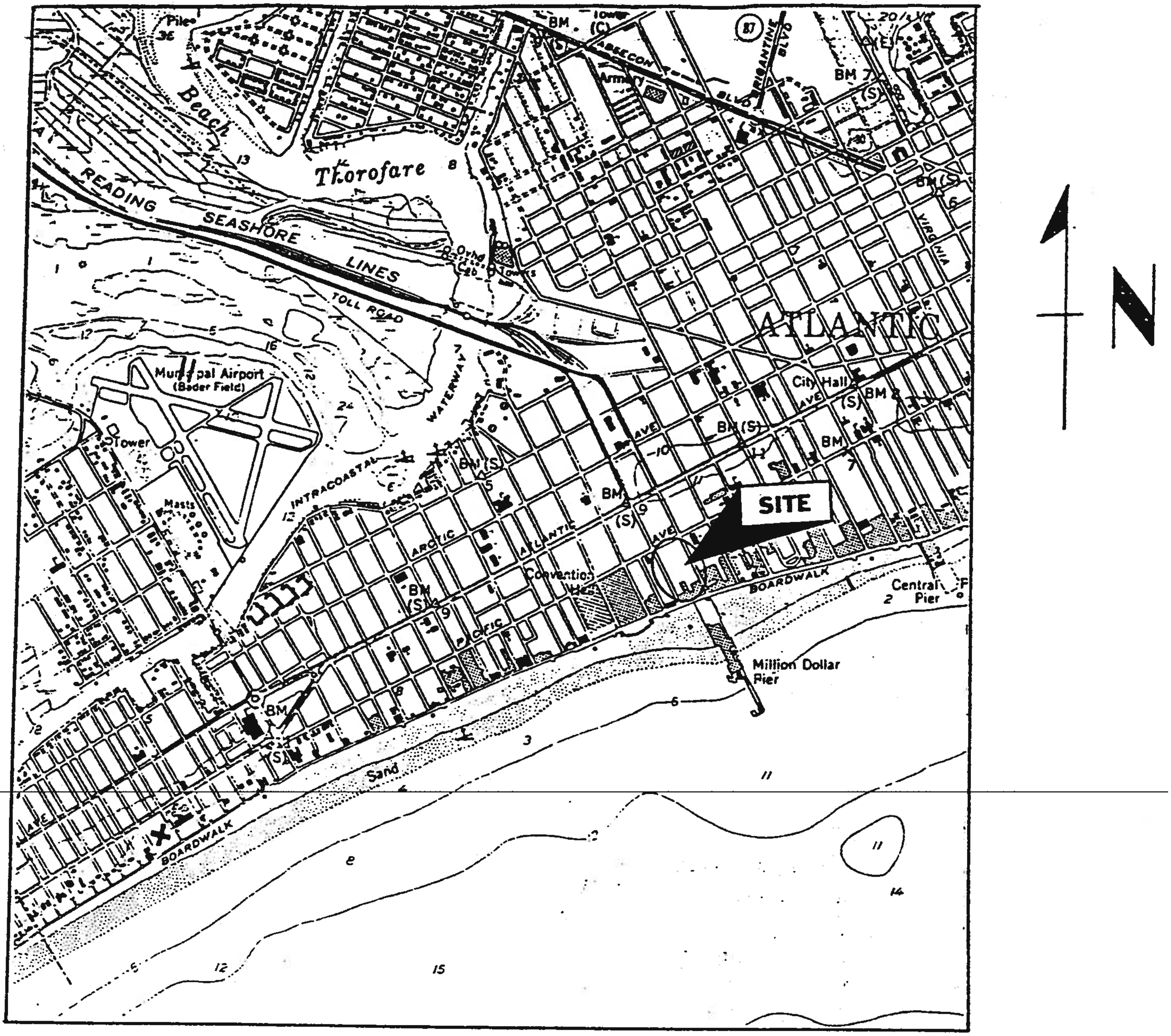
- ✓ SHPO Opinion letter
- ✓ Accessioned report title page and report #
- ____ Property information from accessioned report or historic sites inventory (indicate HSI#)
- ____ Photograph(s)
- ✓ Map(s) (USGS map with property located, labelled & showing quad name; tax map; site plan)

Additional information available in report or HSI: ✓ yes ___no

Other Materials (check if applicable):

- ____ HABS/HAER documentation
- ____ Preservation Plan
- ✓ Conditions Assesment
- ✓ Historic Structure Report
- ____ Alternative Analysis Report
- ____ Project file
  ProjectName: CAESAR'S CASINO - HOTEL EXPANSION
  0102-95-0021.1
- ____ Other

Prepared by: D SAUNDERS Date: 7-9-98



Scale: 1" = 2000'

SITE LOCATION MAP

CAESARS HOTEL/CASINO

ATLANTIC CITY, ATLANTIC CO., NJ

LJG REF. NO. 3078.P1/9

PLATE 1

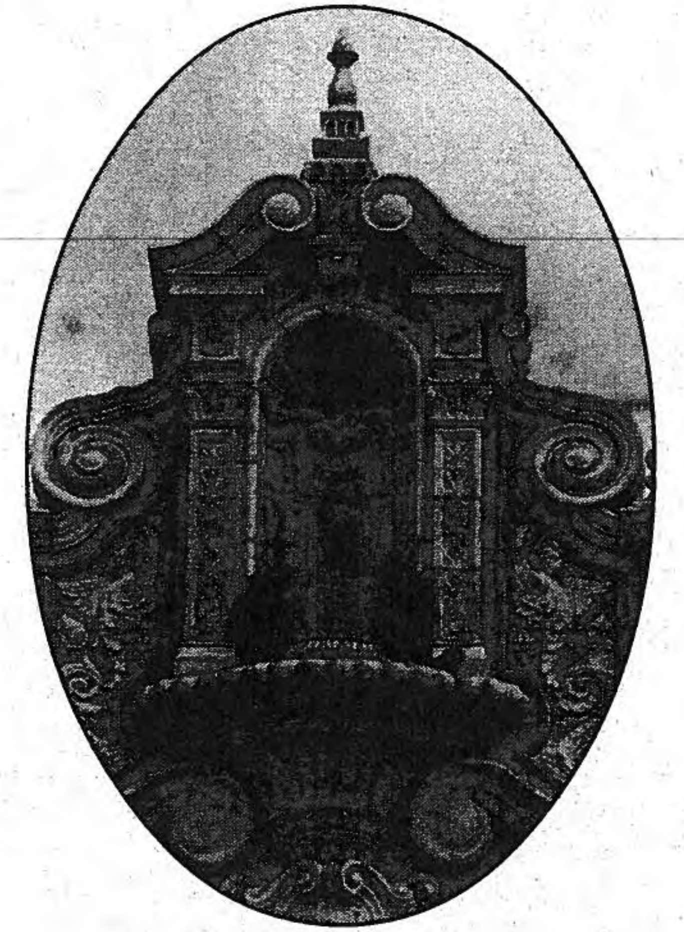
THE WARNER THEATER
Atlantic City, New Jersey

ARCHITECTURAL SURVEY
(Existing Conditions Report)

ID 581

prepared for

CAESARS ATLANTIC CITY
Renovation/Expansion



by

JOHN MILNER ASSOCIATES, INC.
309 North Matlack St.
West Chester, PA 19380

November 1996

INTRODUCTION

The Warner Theater, Atlantic City, New Jersey, has been determined eligible for listing on the National Register of Historic Places by the New Jersey State Historic Preservation Office. Based on that determination of eligibility and to comply with the terms of the Coastal Area Facility Review Act (CAFRA) of New Jersey permitting process, Caesars Atlantic City was asked to prepare an architectural assessment of the Warner Theater. The assessment addresses the condition of existing building fabric and proposes recommendations for renovation. During the months of June and July, 1996, John Milner Associates, Inc. (JMA's) project team visited the Warner Theater site to observe the existing condition of the exterior envelope and roof system of the building, including brick, terra cotta masonry, windows and doors, significant interior finishes, roofing and related structural elements. Observations were made from grade using the naked eye and binoculars, from ladders, and from roof areas. In addition, a sixty foot hi-reach lift was made available to the JMA survey team to allow documentation of the roofs and upper levels of the terra cotta facade elements. JMA reviewed a report made available by the Caesars Hotel and Casino, Atlantic City (owners of the property) written by Elton Engineers, Inc. (Elton), dated May 2, 1996. Lastly, four test openings were made in the roof materials to determine number of layers and the presence of asbestos containing materials: two in the upper roof area, and two in the lower roof. In addition, the concrete roof deck was tested for compressive strength following the removal of roofing materials. The test openings and evaluations were done by Lippincott, Jacobs & Gouda, Civil Engineers.

The purpose of this Report is to inform Caesars Atlantic City of our findings, to provide recommendations for addressing identified problems, and to satisfy Caesar's obligations under the CAFRA permitting process for evaluation of properties deemed eligible for nomination to the National Register of Historic Places. The existing conditions survey of the building provided a detailed record of its present condition. Recommendations were developed to address noted problems. Repair recommendations were based on JMA's experience in assessing the rate of deterioration of building materials and the consequences of permitting this process to remain unchecked, life safety issues, the severity of observed deterioration, the threat to adjacent building fabric, and the cost of accessing work areas.

The existing building shell of the Warner Theater in Atlantic City, New Jersey, represents only the original entrance lobby space, the much larger theater auditorium having been demolished in 1960. Main access to the theater was from the boardwalk through the extant lobby space, the floor sloped gently upward from south to north leaving theater patrons even with the rear of the auditorium, with seating dropping toward the screen to the west. The sloping grade change from the boardwalk level to the rear of the theater was almost six feet, paved with an elaborate tile pattern and tile base, little of which remains at the jagged edges of the removed original slab. The present floor is a flat concrete slab paved with a variety of materials reflecting the changing uses of the structure over time. The original mezzanine, located at the front two bays of the building, was used to access the marquee and window lighting. Several intermediate mezzanine floors have been inserted in the rear large volume of the structure, obscuring the original decorative plaster ceiling and wall finishes, and severely altering perceptions of the original space.

Appendix D

Photograph Log and Key Map

Legend

↑ Photograph location and direction

7 Photograph number

IMAGERY SOURCE: New Jersey Geographic Information Network 2007
DATA SOURCE: New Jersey Geographic Information Network, Historic Properties 2008

amec Earth & Environmental

Appendix D - Photo Key Map 1 of 4
Proposed 20 MW Offshore Wind Project
Offshore of Atlantic County, New Jersey

FISHERMEN'S ENERGY

Reviewed By: CB	Contract Number: 7-7523-0003	August 2010

Appendix D - Photo Key Map 2 of 4
Proposed 20 MW Offshore Wind Project
Offshore of Atlantic County, New Jersey

IMAGERY SOURCE: New Jersey Geographic Information Network 2007
DATA SOURCE: New Jersey Geographic Information Network, Historic Properties 2008

Reviewed By: CB	Contract Number: 7-7523-0003	August 2010

Legend

- ● Photograph location and direction
- 7 Photograph number

IMAGERY SOURCE: New Jersey Geographic Information Network 2007
DATA SOURCE: New Jersey Geographic Information Network, Historic Properties 2008

amec Earth & Environmental

Appendix D - Photo Key Map 3 of 4
Proposed 20 MW Offshore Wind Project
Offshore of Atlantic County, New Jersey

Reviewed By: CB	Contract Number: 7-7523-0003	August 2010

Legend

↑ Photograph location and direction

7 Photograph number

IMAGERY SOURCE: New Jersey Geographic Information Network 2007
DATA SOURCE: New Jersey Geographic Information Network, Historic Properties 2008

amec Earth & Environmental

Appendix D - Photo Key Map 4 of 4
Proposed 20 MW Offshore Wind
Project Offshore of Atlantic County,
New Jersey

Reviewed By: CB | Contract Number: 7-7523-0003 | August 2010

Photo 1 – Ventnor City, NJ

View from the boardwalk at the SE end of S. Austin Avenue - facing SE.

(This street is part of the John Stafford Historic District).

N 39.34237
W -074.46662

Photo 2 – Ventnor City, NJ

Same photo as above with turbine position overlay.

285 Davidson Avenue
Somerset, New Jersey 08873

VIEWSHED ANALYSIS

Photograph Log

Atlantic County, NJ

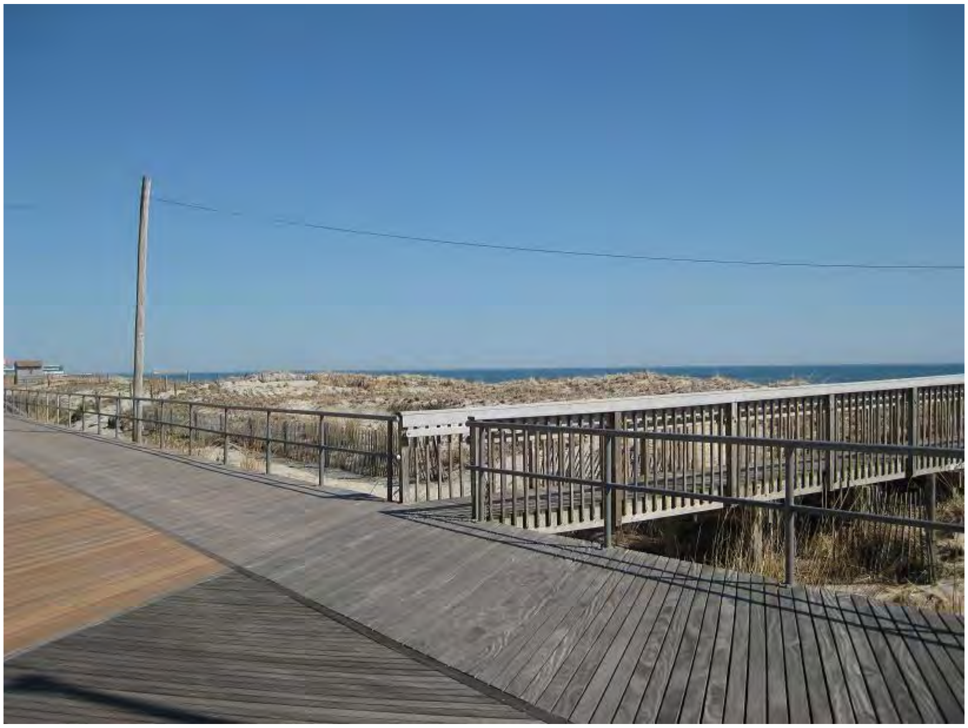


Photo 3 – Ventnor City, NJ

View from the boardwalk at the SE end of S. Austin Avenue - facing E.

(This street is part of the John Stafford Historic District).

N 39.34237
W -074.46662

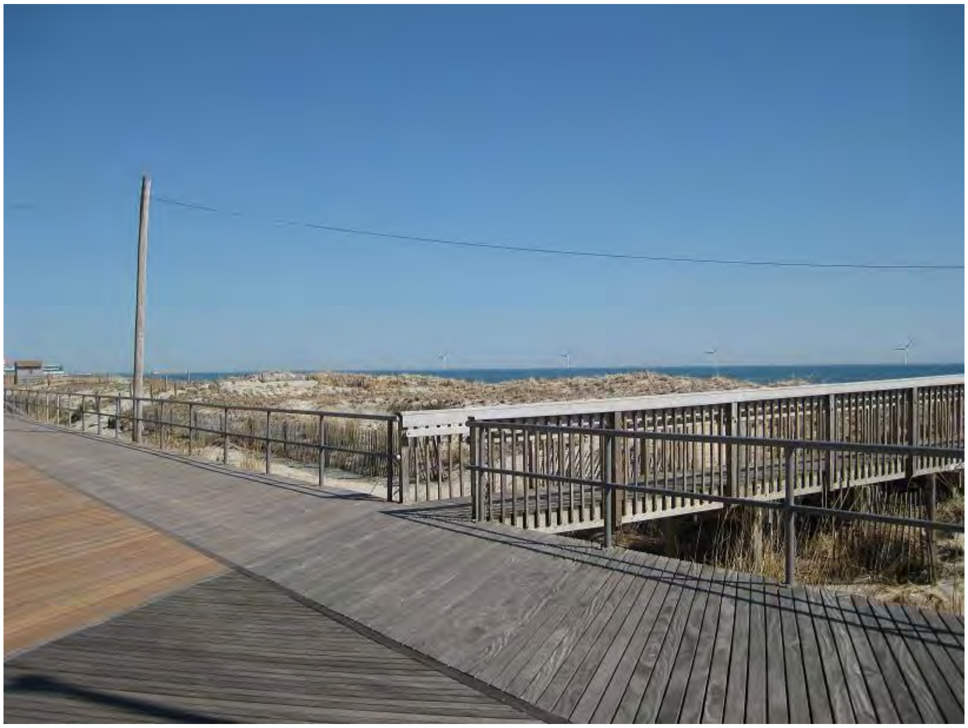


Photo 4 – Ventnor City, NJ

Same photo as above with turbine position overlay.

Photo 5 – Ventnor City, NJ

View from the boardwalk at the SE end of S. Marion Avenue - facing SE.

(This street is part of the John Stafford Historic District).

N 39.34262
W -074.46609

Photo 6 – Ventnor City, NJ

Same photo as above with turbine position overlay.

Photo 7 – Ventnor City, NJ

View from the boardwalk at the SE end of S. Marion Avenue - facing E.

(This street is part of the John Stafford Historic District).

N 39.34262
W -074.46609

Photo 8 – Ventnor City, NJ

Same photo as above with turbine position overlay.

Photo 9 – Ventnor City, NJ

View from the boardwalk at the SE end of S. Baton Rouge Avenue - facing SE.

(This street is part of the John Stafford Historic District).

N 39.34284
W -074.46552

Photo 10 – Ventnor City, NJ

Same photo as above with turbine position overlay.

Photo 11 – Ventnor City, NJ

View from the boardwalk at the SE end of S. Baton Rouge Avenue - facing E.

(This street is part of the John Stafford Historic District).

N 39.34284
W -074.46552

Photo 12 – Ventnor City, NJ

Same photo as above with turbine position overlay.

Photo 13 – Ventnor City, NJ

View from the boardwalk at the SE end of S. Vassar Square - facing SE.

(This street is part of the John Stafford Historic District).

N 39.34308
W -074.46505

Photo 14 – Ventnor City, NJ

Same photo as above with turbine position overlay.

Photo 15 – Ventnor City, NJ

View from the boardwalk at the SE end of S. Vassar Square - facing E.

(This street is part of the John Stafford Historic District).

N 39.34308
W -074.46505

Photo 16 – Ventnor City, NJ

Same photo as above with turbine position overlay.

Photo 17 – Atlantic City, NJ

View from the 2nd story balcony of the Raphael-Gordon House - facing SE.

N 39.34409
W -074.46476

Photo 18 – Atlantic City, NJ

Same photo as above with turbine position overlay.

Photo 19 – Atlantic City, NJ

View from the SE corner of the Raphael-Gordon House property - facing SE.

N 39.34408
W -074.46472

Photo 20 – Atlantic City, NJ

Same photo as above with turbine position overlay.

Photo 21 – Atlantic City, NJ

View from the boardwalk at the SE faces of the former Strand and Marine Apartments - facing SE.

N 39.34826
W -074.45434

Photo 22 – Atlantic City, NJ

Same photo as above with turbine position overlay.

Photo 23 – Atlantic City, NJ

View from the boardwalk at the SE faces of the former Strand and Marine Apartments - facing E.

N 39.34826
W -074.45434

Photo 24 – Atlantic City, NJ

Same photo as above with turbine position overlay.

Photo 25 – Atlantic City, NJ

View from the stage in front of the former Atlantic City Convention Hall - facing S.

(The building is now the "Boardwalk Hall" arena)

N 39.35376
W -074.43798

Photo 26 – Atlantic City, NJ

Same photo as above with turbine position overlay.

Photo 27 – Atlantic City, NJ

View from the stage in front of the former Atlantic City Convention Hall - facing SE.

(The building is now the “Boardwalk Hall” arena)

N 39.35376
W -074.43798

Photo 28 – Atlantic City, NJ

Same photo as above with turbine position overlay.

Photo 29 – Atlantic City, NJ

View from the stage in front of the former Atlantic City Convention Hall - facing E.

(The building is now the "Boardwalk Hall" arena)

N 39.35376
W -074.43798

Photo 30 – Atlantic City, NJ

Same photo as above with turbine position overlay.

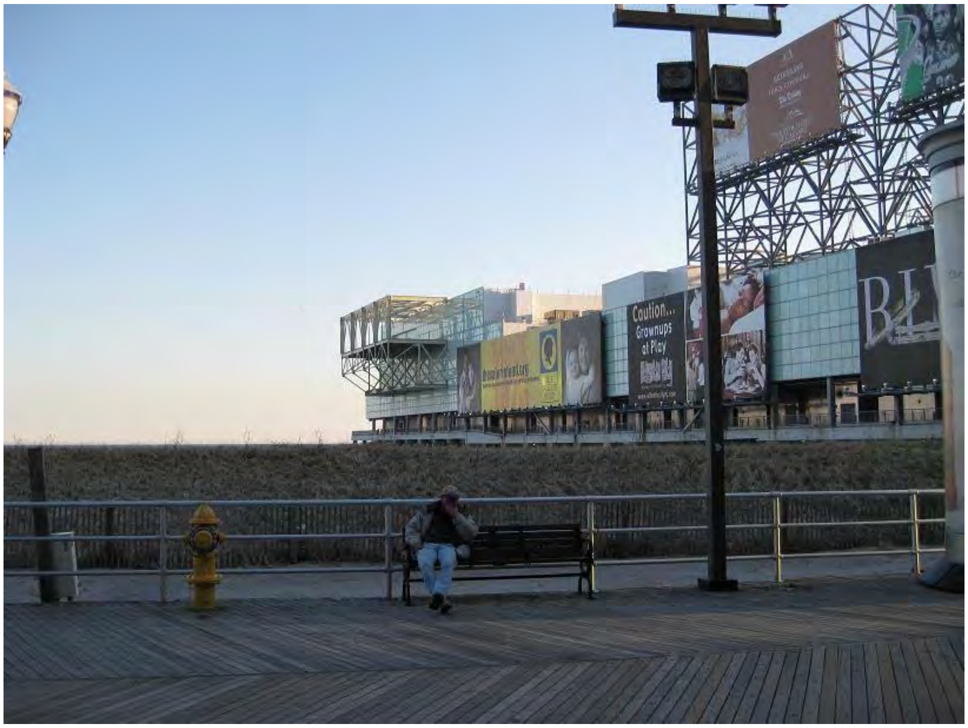


Photo 31 – Atlantic City, NJ

View from the boardwalk at the base of the Warner Theatre façade - facing S.

(Façade is now part of the Bally's Hotel and Casino)

N 39.35528
W -074.43387

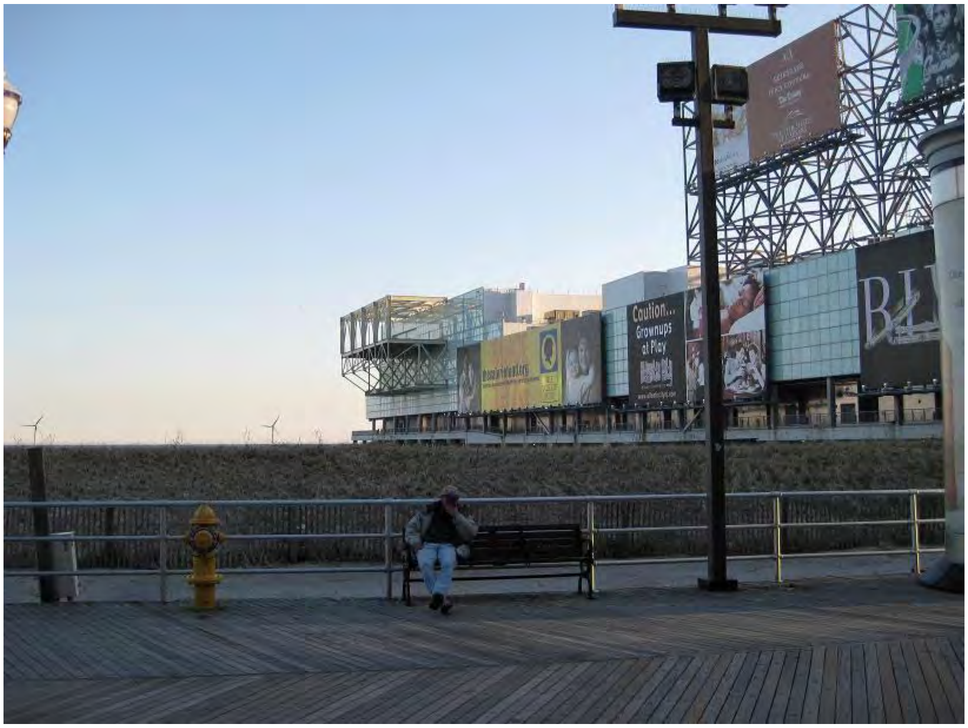


Photo 32 – Atlantic City, NJ

Same photo as above with turbine position overlay.

Photo 33 – Atlantic City, NJ

View from the boardwalk at the base of the Warner Theatre façade - facing SE.

(Façade is now part of the Bally's Hotel and Casino)

N 39.35528
W -074.43387

Photo 34 – Atlantic City, NJ

Same photo as above with turbine position overlay.

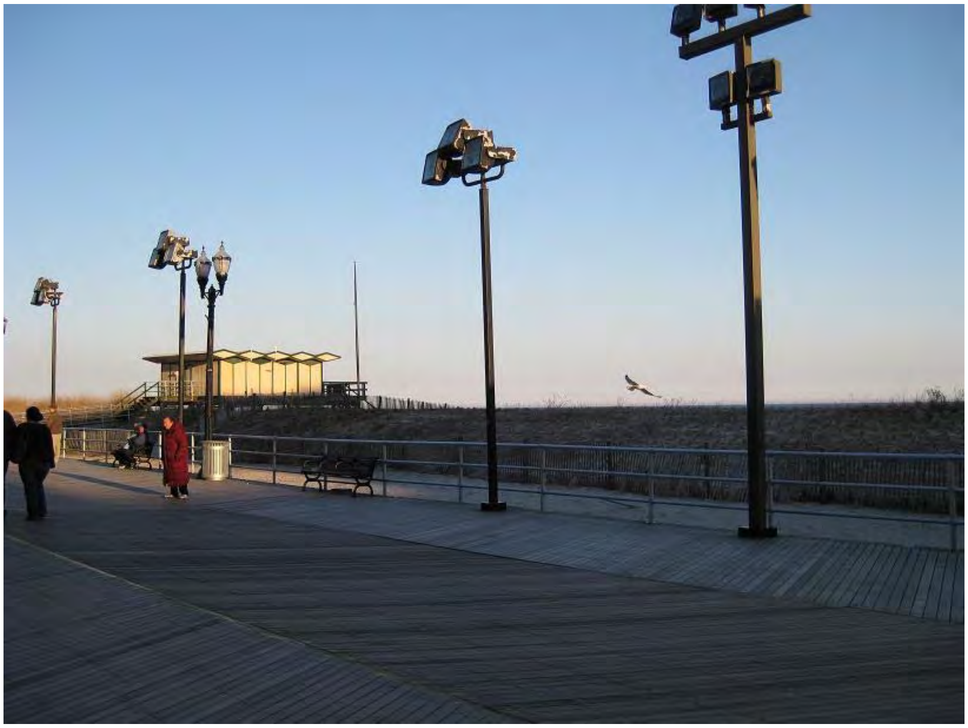


Photo 35 – Atlantic City, NJ

View from the boardwalk at the base of the Warner Theatre façade - facing E.

(Façade is now part of the Bally's Hotel and Casino)

N 39.35528
W -074.43387

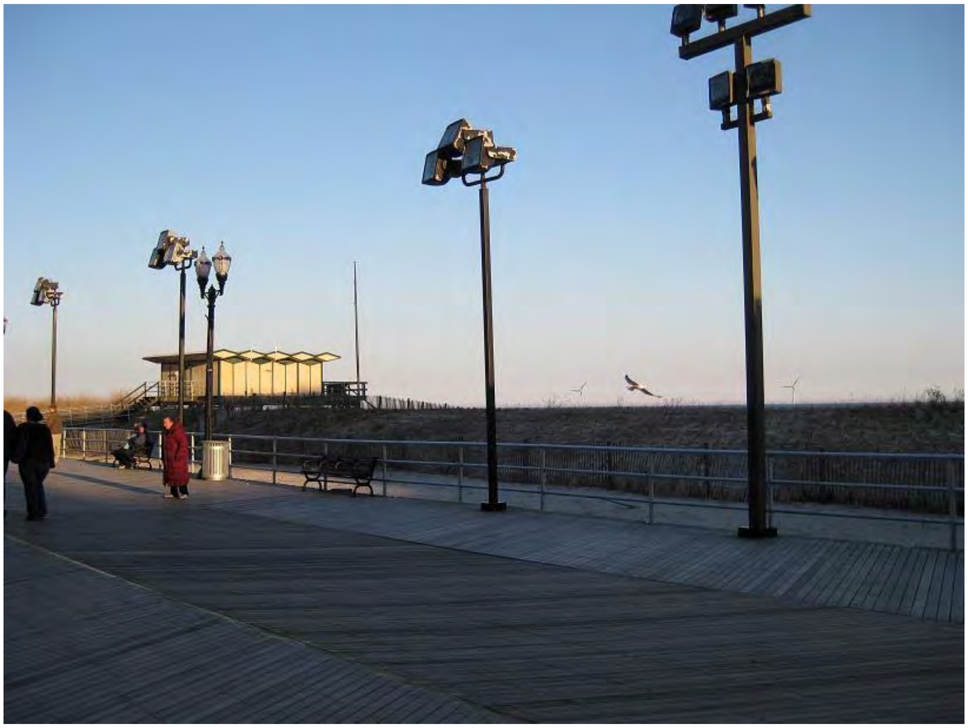


Photo 36 – Atlantic City, NJ

Same photo as above with turbine position overlay.

Photo 37 – Atlantic City, NJ

View from the lookout platform on top of the Absecon Lighthouse - facing S.

N 39.36634
W -074. 41414

Photo 38 – Atlantic City, NJ

Same photo as above with turbine position overlay.

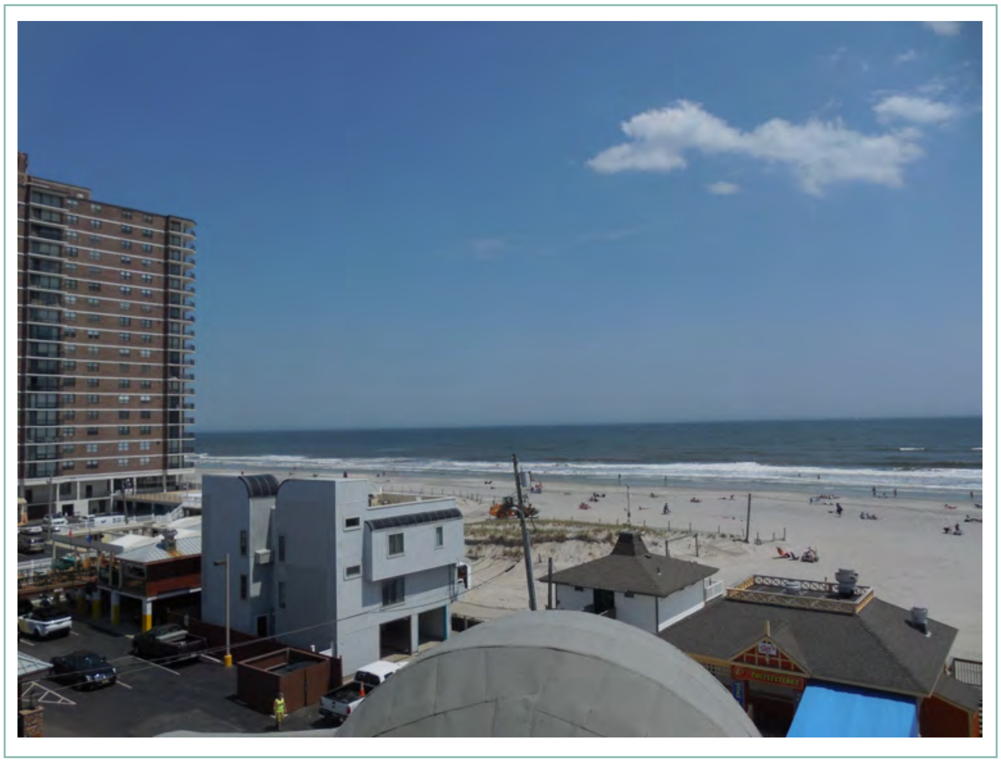


Photo 39 –
Margate, NJ

View from the howdah on top of Lucy the Margate Elephant - facing S.

N 39.32055
W -074. 51138

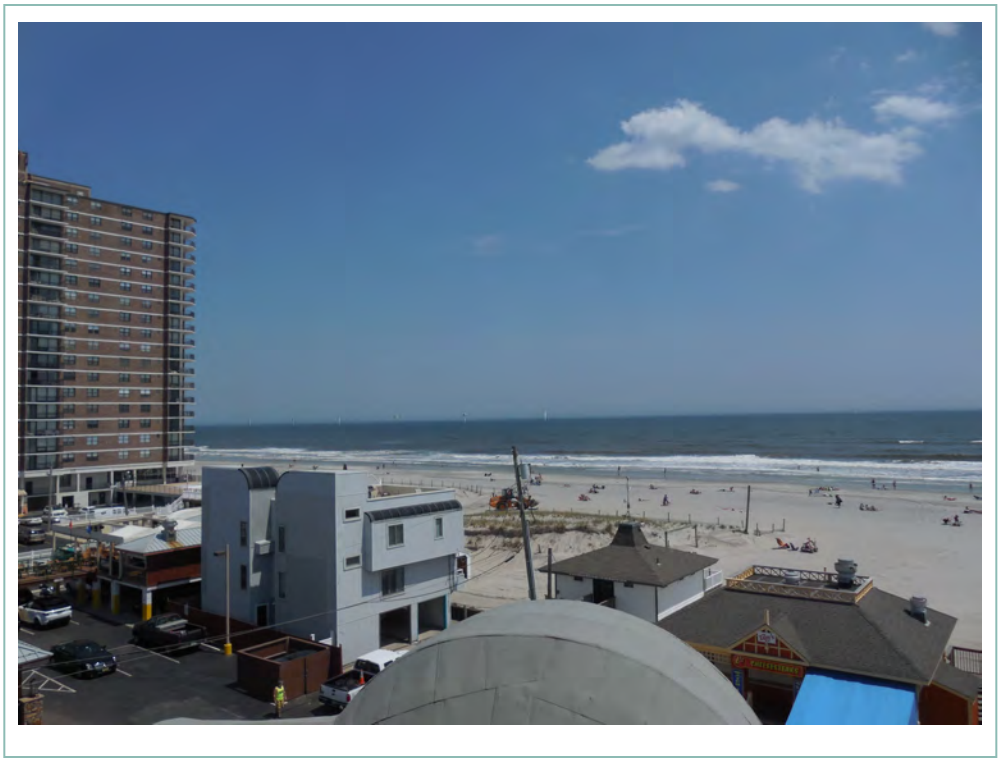


Photo 40 – Atlantic City, NJ

Same photo as above with turbine position overlay.

285 Davidson Avenue
Somerset, New Jersey 08873

VIEWSHED ANALYSIS

Photograph Log

Atlantic County, NJ

Photo 41 –
Margate, NJ

View from the
howdah on top
of Lucy the
Margate
Elephant -
facing S.

N 39.32055
W -074. 51138

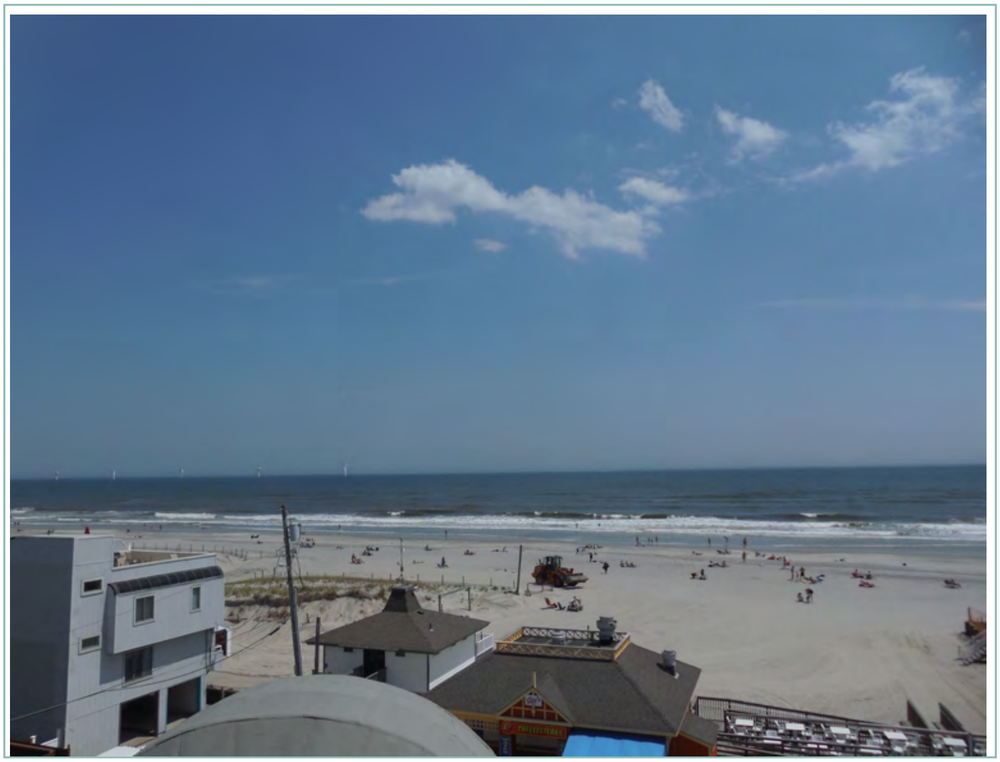
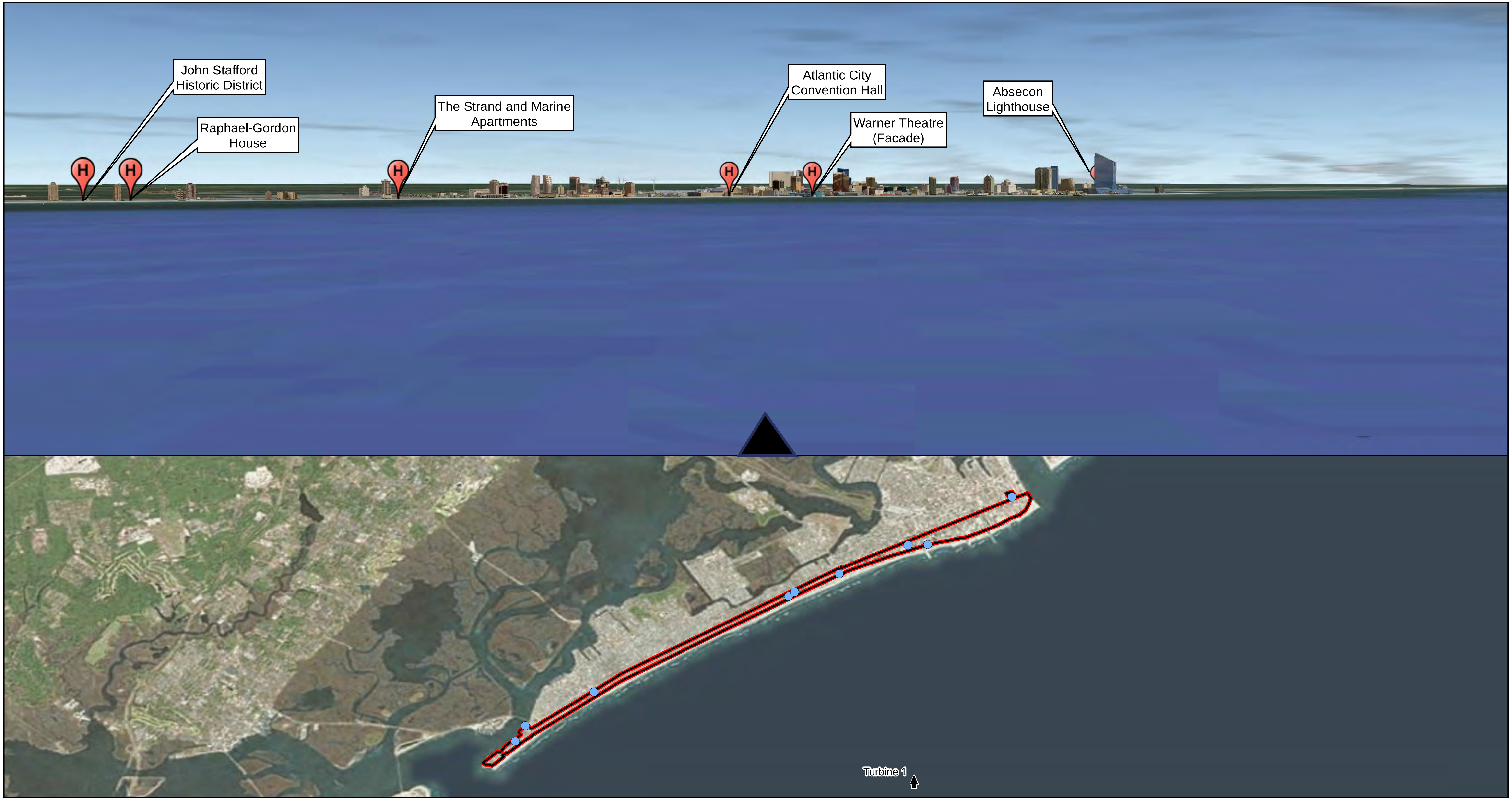


Photo 42 – Atlantic
City, NJ

Same photo as
above with turbine
position overlay.



Fishermen's Energy, LLC.

Amec Foster Wheeler
Environment & Infrastructure
690 Commonwealth Center
11003 Bluegrass Parkway
Louisville, KY 40299

MAP BY: chad.knopf
CHK'D BY: MEP
DATUM: WGS 1984
PROJECTION: GCS WGS 1984
SCALE: 1 inch = 2 miles

PROJECT:
Fishermen's Energy, LLC.
Atlantic City Windfarm

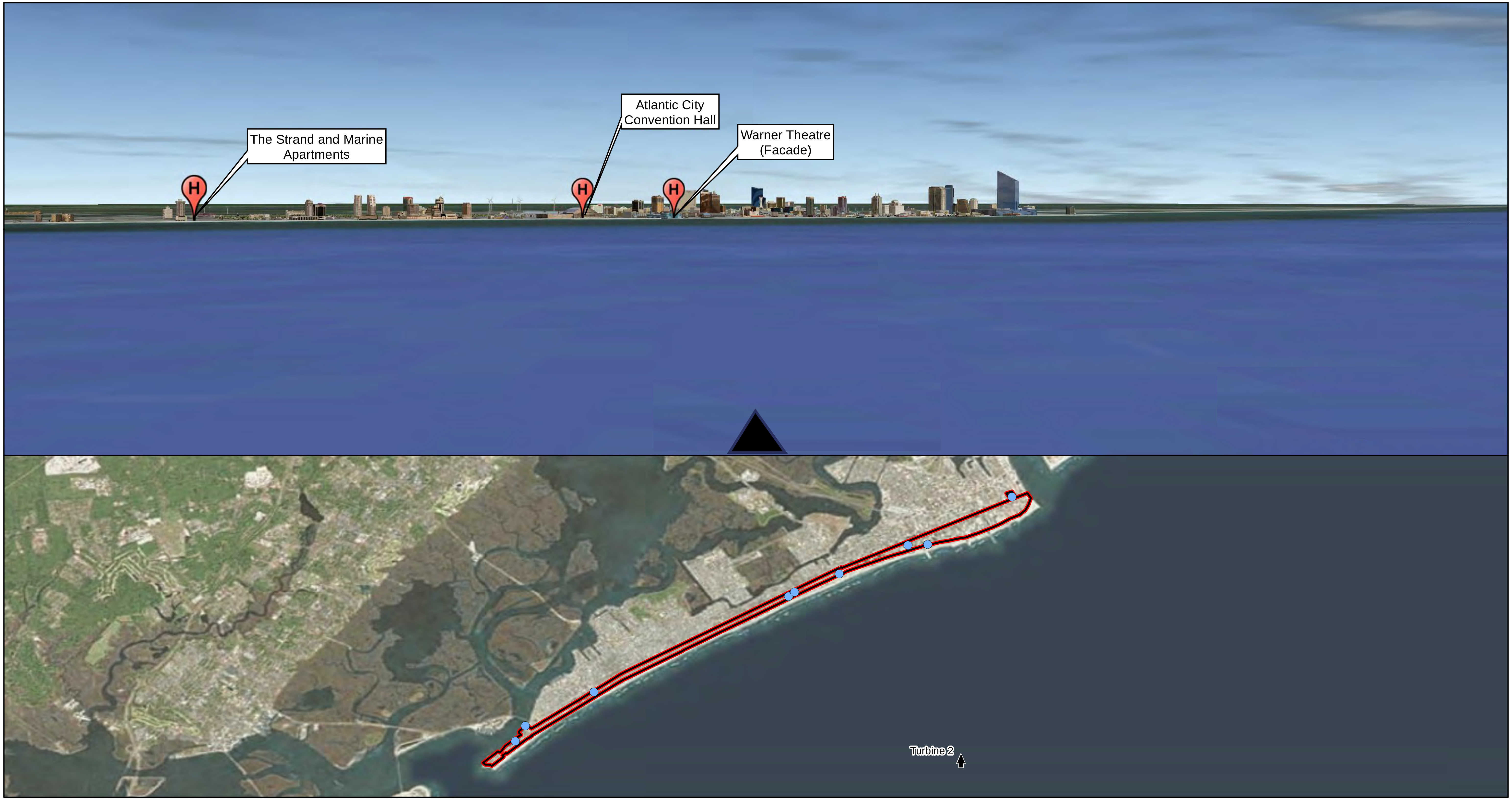
TITLE:
Turbine View

LEGEND:
● Historic Resource
▲ Turbine Direction
▭ Project Area of Potential Effect

TIME: 11:45:04 AM
DATE: 6/3/2015
PROJECT #: 775230003
FIGURE #: 9

Eye_Alt_T1_11x17

Imagery: ESRI, 2011 | Google 2015



Fishermen's Energy, LLC.

Amec Foster Wheeler
Environment & Infrastructure
690 Commonwealth Center
11003 Bluegrass Parkway
Louisville, KY 40299

MAP BY:
chad.knopf

CHK'D BY:
MEP

DATUM:
WGS 1984

PROJECTION:
GCS WGS 1984

SCALE:
1 inch = 2 miles

PROJECT:
Fishermen's Energy, LLC.
Atlantic City Windfarm

TITLE:
Turbine View

LEGEND:
● Historic Resource
▲ Turbine Direction
▭ Project Area of Potential Effect

TIME:
11:55:36 AM

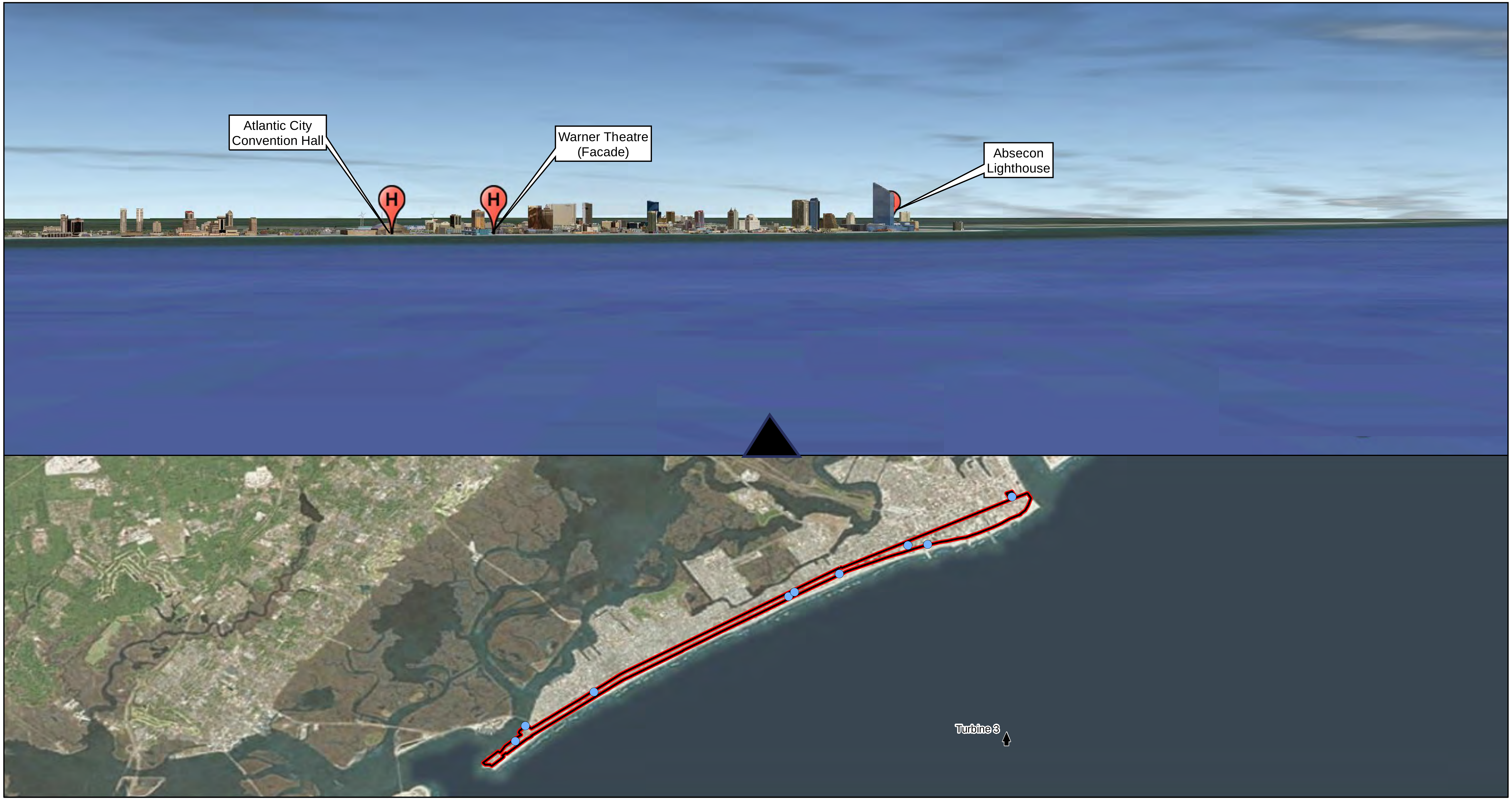
DATE:
6/3/2015

PROJECT #:
775230003

FIGURE #:
10

Eye_Alt_T2_11x17

Imagery: ESRI, 2011 | Google 2015



Fishermen's Energy, LLC.

Amec Foster Wheeler
Environment & Infrastructure
690 Commonwealth Center
11003 Bluegrass Parkway
Louisville, KY 40299

amec foster wheeler

MAP BY: chad.knopf
CHK'D BY: MEP
DATUM: WGS 1984
PROJECTION: GCS WGS 1984
SCALE: 1 inch = 2 miles

PROJECT:
Fishermen's Energy, LLC.
Atlantic City Windfarm

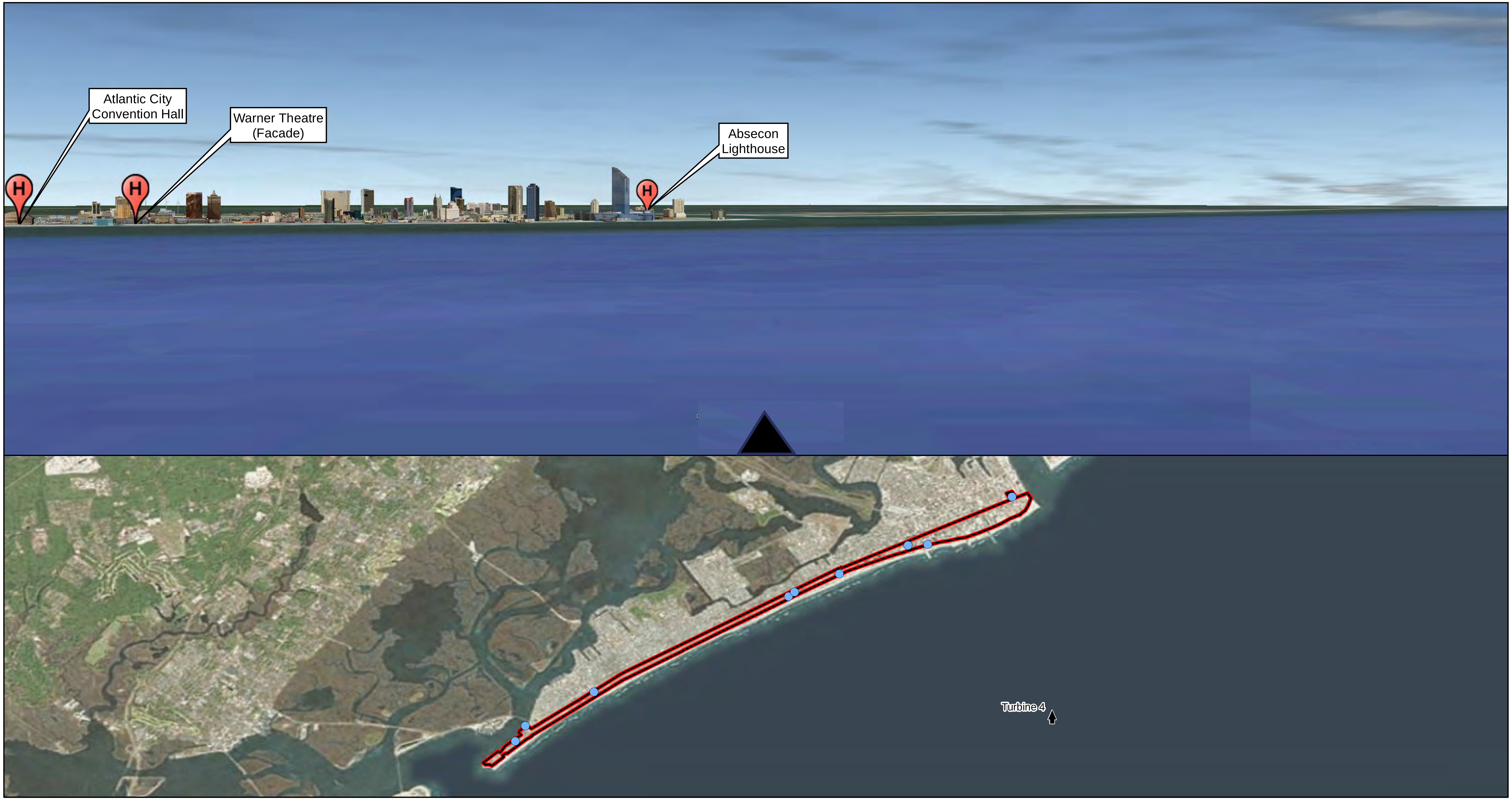
TITLE:
Turbine View

LEGEND:
- ● Historic Resource
- ⬆ Turbine Direction
- ▭ Project Area of Potential Effect

TIME: 12:02:19 PM
DATE: 6/3/2015
PROJECT #: 775230003
FIGURE #: 11

Eye_Alt_T3_11x17

Imagery: ESRI, 2011 | Google 2015



Fishermen's Energy, LLC.

Amec Foster Wheeler
Environment & Infrastructure
690 Commonwealth Center
11003 Bluegrass Parkway
Louisville, KY 40299

MAP BY: chad.knopf
CHK'D BY: MEP
DATUM: WGS 1984
PROJECTION: GCS WGS 1984
SCALE: 1 inch = 2 miles

PROJECT:
Fishermen's Energy, LLC.
Atlantic City Windfarm

TITLE:
Turbine View

LEGEND:
● Historic Resource
▲ Turbine Direction
▭ Project Area of Potential Effect

TIME: 12:08:16 PM
DATE: 6/3/2015
PROJECT #: 775230003
FIGURE #: 12

Eye_Alt_T4_11x17

Imagery: ESRI, 2011 | Google 2015

Fishermen's Energy, LLC.

Amec Foster Wheeler
Environment & Infrastructure
690 Commonwealth Center
11003 Bluegrass Parkway
Louisville, KY 40299

MAP BY:
chad.knopf

CHK'D BY:
MEP

DATUM:
WGS 1984

PROJECTION:
GCS WGS 1984

SCALE:
1 inch = 2 miles

PROJECT:
Fishermen's Energy, LLC.
Atlantic City Windfarm

TITLE:
Turbine View

LEGEND:
● Historic Resource
⬆ Turbine Direction
🟥 Project Area of Potential Effect

TIME:
12:13:44 PM

DATE:
6/3/2015

PROJECT #:
775230003

FIGURE #:
13

Eye_Alt_T5_11x17

Imagery: ESRI, 2011 | Google 2015

Fishermen's Energy, LLC.

Amec Foster Wheeler
Environment & Infrastructure
690 Commonwealth Center
11003 Bluegrass Parkway
Louisville, KY 40299

amec foster wheeler

MAP BY: chad.knopf
CHK'D BY: MEP
DATUM: WGS 1984
PROJECTION: GCS WGS 1984
SCALE: 1 inch = 2 miles

PROJECT:
Fishermen's Energy, LLC.
Atlantic City Windfarm

TITLE:
Turbine View

LEGEND:
● Historic Resource
↑ Turbine Direction
▭ Project Area of Potential Effect

TIME: 12:18:58 PM
DATE: 6/3/2015
PROJECT #: 775230003
FIGURE #: **14**

Eye_Alt_T6_11x17

Imagery: ESRI, 2011 | Google 2015

APPENDIX I

DECOMMISSIONING PLAN

December 2014

Decommissioning Plan

December 2014
Fishermen's Energy Atlantic City Wind Farm (FACW)

Document Number: FACW-FE-00-CM-PC-01

Decommissioning Plan

December 2014

Fishermen's Energy Atlantic City Wind Farm (FACW)

Document Number: FACW-FE-00-CM-PC-01

Issue and revision record

Revision	Date	Originator	Checker	Approver	Description
Rev C1	Dec. 12 2014	T. Axelsson	T. Axelsson	S. White	Issued for Review

Content

Chapter Title Page

Tables

Figures

1. Introduction

Fishermen’s Atlantic City Windfarm LLC (FACW) is a wholly owned subsidiary of Fishermen’s Energy LLC (FE), the parent company, and is based in Atlantic City New Jersey. FACW has applied for and received permit approvals by the state of New Jersey Department of Environmental Protection (NJDEP) and the US Army Corps of Engineer (USACOE) for the construction of a six turbine, 25MW offshore wind farm (OWF) located approximately 2.8nm off of Atlantic City, New Jersey. All permits, easements, leases and approvals have been issued for the placement and installation of the necessary structures, cables and other components that form the OWF plant. As a condition of these permit approvals it will be necessary to decommission the structures, cables and other components at the end of the useful life of the plant, which is estimated to be 25 years after start of commercial operations.

The requirements by which the OWF is subject to decommissioning are stipulated in the USACOE permit issued June 2012, and the NJDEP permit issued May 2011. The following components will be removed as part of the decommissioning of the installed plant:

1. Turbines
2. Towers
3. Blades
4. Foundations
5. Cabling

This document represents the preliminary decommissioning plan for the FACW OWF. The decommissioning plan is informed and supported by the environmental assessments that FACW has undertaken as part of the permitting process.

This decommissioning program has also been informed by the following key documents:

- Code of Federal Regulations: 30-CFR-285.103; 285.902; 285.906; 285.908;
- Offshore Wind Energy Installation and Decommissioning Cost Estimation in the US Outer Continental Shelf, BOEM report issued November 2010;
- United Nations Convention on the Law of the Sea (UNCLOS), 1982;
- State and Federal Health and Safety Regulations;

The FACW project is not subject to federal BOEM regulations as it is located within the state waters of New Jersey. However, we feel it prudent to use existing federal guidelines and regulations to form our decommissioning process and planning. The NJDEP is clear in that the offshore wind plant is required to be decommissioned and FACW have included a preliminary decommissioning plan with our application for permits to construct.

A summary of the proposal for decommissioning the offshore components of the FACW OWF are outlined in Table 1-1 below:

Component	**Proposed Decommissioning Measure**
Wind Turbine/generating equipment	Complete removal from site including: blades, turbine nacelles, towers.
Foundations (wind turbines)	Cut off 15’ below seabed and removed
Cables (marine export)	Buried portions left *in situ*
Cables (inter-array)	Buried portions left *in situ*
Scour Protection	Left *in situ*

Table 1-1: Decommissioning Plan for FACW OWF Components

It is currently proposed that the FACW project has a life-cycle of 25 years with the exception of the Wind Turbine Generators (WTG) which have a design life of 20 years. Current FACW planning for the OWF lifecycle operation includes a repowering program. Therefore, decommissioning of the site could commence at year 40. For a repowering program to take effect there are easements and other seabed leases that will need to be extended and these impacts will need to be taken into consideration for a repowering program. The final schedule of works will be determined once the final review of this document is completed.

As the wind farm nears the end of its operational life, FACW will initiate a final review of this document and the proposed decommissioning program. Once this review is complete a Decommissioning Work Program will be developed outlining the particular methods, measures and timing that will be employed.

A final decommissioning report will be submitted to the appropriate regulatory authorities after completion as required under the permits issued.

A cost estimate for the program has been derived based on the equipment and personnel requirements and the duration of the works. Financial security provisions have been carefully considered to ensure that this liability will be met (see Section 8 of this document).

The program outlines the methods for decommissioning, paying particular attention to:

- comparing the methods of partial and complete removal of foundations;
- considering integration and cooperation with other companies during decommissioning;
- the expected timeframes and costs of removal;
- environmental impacts;
- monitoring;
- regular reviews to reflect changing circumstances and knowledge over the project lifetime.

This program is to be reviewed and revised as necessary throughout the lifecycle of the project to reflect changing circumstances and regulatory requirements, and to incorporate improvements in knowledge and understanding of the marine environment and advancements in technology and working practices.

.

2. Information

2.1 Project Description

The current proposal for the FACW project comprises construction of up to 6 turbines with no offshore substation. As per analysis, the minimum distance between the turbines will be no less than 1,080 meters and the turbine height from the sea (MSL) to blade tip when vertical will be no higher than 156 meters. The blade tip clearance above sea (MHW) will be no less than 24 meters. The WTG units will be installed upon Inward Battered Guide Structure (IBGS) foundations.

The OWF development will have associated electrical infrastructure comprising both inter-array and export sub-sea cables. In addition, there will be onshore buried cables and a new onshore substation forming the connection to the onshore electrical grid network.

Specific details of the key elements of the offshore wind farm, namely the turbines, inter-array cables, export cables and offshore substation are provided in the following Section 3.

The project is planned to be in place for a 40 year lifespan

2.1.1 Repowering

The removal of existing turbines and addition of newer, more efficient models may be performed as an option after approximately 20 years, which is the design life of the WTG's. This will be subject to further environmental studies at the time.

2.2 Project Status

FACW OWF has achieved full permitting as outlined in Table 2-1 below:

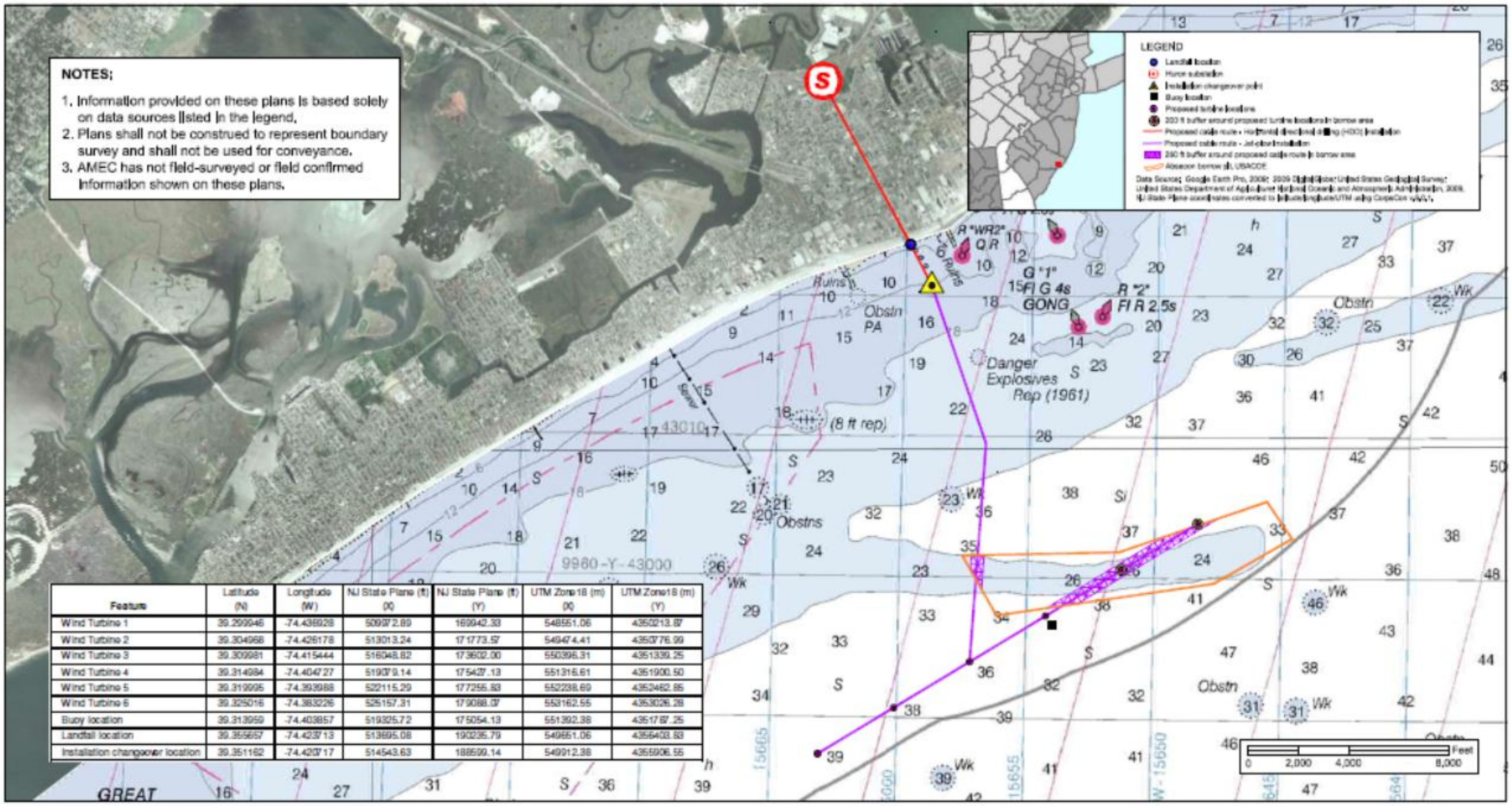
#	Permit	Agency	Description	Issued
1	Individual Multiple Permit Application	NJDEP DLUR	CAFRA, Waterfront Development, 401 Water Quality Certification for placement of turbines/cables	Mar 29, 2011
2	Tidelands License	NJDEP DLUR	Bureau of Tidelands Management covers placement of the cable in open waters	May 4, 2011

#	Permit	Agency	Description	Issued
3	Green Acres	NJDEP	Allows for placement of the cable under the beach at the foot of Tennessee Avenue	May 2, 2011
4	Individual 404 Permit Application	US ACOE	Federal permit for the placement of turbines and cables in open waters	Jun 10, 2012
5	FAA Clearance	FAA	Determination of no hazard to air navigation from towers above 200 feet in height	Mar 16, 2011
6	Grid Connection: Interconnect Service Agreement Construction Service Agreement	PJM	Power connection to the grid and modifications to point of interconnect.	Expected 4Q 2012

Table 2-1: Permit and Grid Interconnect Agreement Status

The project is scheduled to commence installation of offshore foundations in May 2017. Contracts for all elements of the construction phase are subject to be finalized prior to the anticipated financial close.

FACW has established site control of the offshore location as shown by the permits and consents in Table 2-1. Figure 2-1 below is a site map of the OWF location off the coast of Atlantic City, New Jersey:



NOTES:

1. Information provided on these plans is based solely on data sources listed in the legend.
2. Plans shall not be construed to represent boundary survey and shall not be used for conveyance.
3. AMEC has not field-surveyed or field confirmed information shown on these plans.

LEGEND

- ● Landfall location
- ⊙ Huron substation
- ▲ Installation changeover point
- ■ Buoy location
- ● Proposed turbine locations
- ● 200 ft buffer around proposed turbine locations in borrow area
- — Proposed cable route - Horizontal directional drilling (HDD) installation
- — Proposed cable route - Jet-plow installation
- ▨ 250 ft buffer around proposed cable route in borrow area
- ▨ Absecon borrow pit, USACOE

Data Source: Google Earth Pro, 2008; 2009 DigitalGlobe; United States Geological Survey; United States Department of Agriculture; National Oceanic and Atmospheric Administration, 2009. NJ State Plane coordinates converted to latitude/longitude/UTM using CorpsCon v6.0.1.

Feature	Latitude (N)	Longitude (W)	NJ State Plane (ft) (X)	NJ State Plane (ft) (Y)	UTM Zone18 (m) (X)	UTM Zone18 (m) (Y)
Wind Turbine 1	39.299946	-74.436928	509972.89	169942.33	548551.06	4350213.87
Wind Turbine 2	39.304968	-74.426178	513013.24	171773.57	549474.41	4350776.99
Wind Turbine 3	39.309981	-74.415444	516048.82	173602.00	550396.31	4351339.25
Wind Turbine 4	39.314984	-74.404727	519079.14	175427.13	551316.61	4351900.50
Wind Turbine 5	39.319995	-74.393988	522115.29	177255.83	552238.69	4352462.85
Wind Turbine 6	39.325016	-74.383226	525157.31	179088.07	553162.55	4353026.28
Buoy location	39.313959	-74.403857	519325.72	175054.13	551392.38	4351787.25
Landfall location	39.355657	-74.423713	513695.08	190235.79	549651.06	4356403.83
Installation changeover location	39.351162	-74.420717	514543.63	188599.14	549912.38	4355906.55

NOT FOR CONSTRUCTION

REVISIONS

NO.	DESCRIPTION	BY	DATE

ROBERT K. MONAHAN
NJ PROFESSIONAL
ENGINEER NO. GE44911

CLIENT:
FISHERMEN'S ENERGY OF NEW JERSEY, LLC
P.O. BOX 555
CAPE MAY, NEW JERSEY 08201

amec Earth & Environmental

ONE PLYMOUTH MEETING, SUITE 850
PLYMOUTH MEETING, PA 19462-1308
NEW JERSEY CERT. OF AUTH. NO. 24GA28010800

285 DAVIDSON AVENUE, SUITE 405
SOMERSET, NJ 08873-4153

PROJECT
FISHERMEN'S ATLANTIC CITY WINDFARM, LLC
20 MW OFFSHORE WINDFARM

TITLE
FIGURE 1
OVERALL SITE PLAN

DATE: 07/12/2011
PROJECT NO: PROJECT NO.
SCALE: AS SHOWN
SHEET NO. 1

Figure 2-1: FACW Site Map

2.3 Site Characteristics

This section provides a summary of the baseline environment in and around the FACW OWF. The information presented here is taken from the FACW site specific studies, namely:

- Metocean Report
- Marine Geophysical Survey
- Marine Geotechnical Survey

2.3.1 Physical Environment

In conducting an impact assessment of the likely effects on the environment arising from the construction, operational and decommissioning phases of this project, FACW collated a significant baseline dataset of key environmental parameters. From this a summary of the key physical characteristics of the development site is provided below.

2.3.2 Metocean Characteristics

Offshore wave data has been obtained from Ocean Weather Inc. (OWI) and was based on a 100 year return period. This data set was analyzed by Rambøll and resulted in a Metocean Report of site specific metocean conditions. The OWI metocean data also takes into consideration tropical storms and other storm data.

Fishermen's Energy operates a meteorological buoy that has been located at the FACW site and collecting metocean data since April 2010. The data being collected are as follows:

- Wave height and direction
- Wind speed and direction
- Current speed and direction
- Air & Sea temperature
- Barometric Pressure
- Acoustic Monitoring
- Visibility

The site buoy data is being used by our wind resource assessment vendor AWS to determine energy production estimates for turbines being considered for the project. The buoy was on site during Hurricane Isabel and continued to collect wave and current data throughout the entire storm period.

Figure 2-2 shows that the prevailing wind direction over the site is from the southwest, with a significant amount also coming from the northwest.

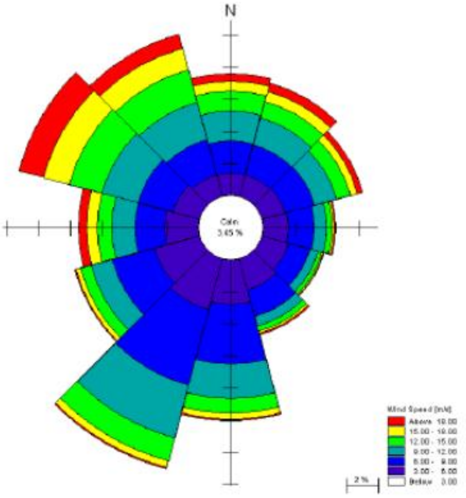


Figure 2-2: FACW Site Wind Rose

2.3.3 Tidal Processes

Table 2-2 presents astronomical tidal characteristics from the NOAA Tide Tables for Atlantic City, which is the nearest standard US port to the development site. The diurnal range on spring tides is 1.4m.

Water level	Elevation [m rt. LAT]	Elevation [m rt. MLLW]
HIGHEST OBSERVED WATER LEVEL (12/11/1992)	-	2.738
HAT	2.164	*1.768*
MEAN HIGHER HIGH WATER (MHHW)	1.799	1.403
MEAN HIGH WATER (MHW)	1.672	1.276
NORTH AMERICAN VERTICAL DATUM-1988 (NAVD88)	1.193	0.797
MEAN SEA LEVEL (MSL)	1.071	0.675
MEAN TIDE LEVEL (MTL)	1.059	0.663
MEAN LOW WATER (MLW)	0.447	0.051
MEAN LOWER LOW WATER (MLLW)	0.396	0.000
LAT	0.000	*-0.396*
LOWEST OBSERVED WATER LEVEL (01/10/1978)	-	-1.362

Table 2-2: FACW Site Specific Tide Datum

2.3.4 Wave Regime

The wave regime is defined here as the combination of swell waves moving into and propagating through the OWF site (having been generated away from the area) and more locally-generated wind-waves. The FACW wind farm site is open to offshore waves that are generated within the Mid-Atlantic area of the east coast of the US.

Rose plots of the significant wave height (Total, Wind Sea and Swell) are given in Figure 2-3, Figure 2-4 and Figure 2-5:

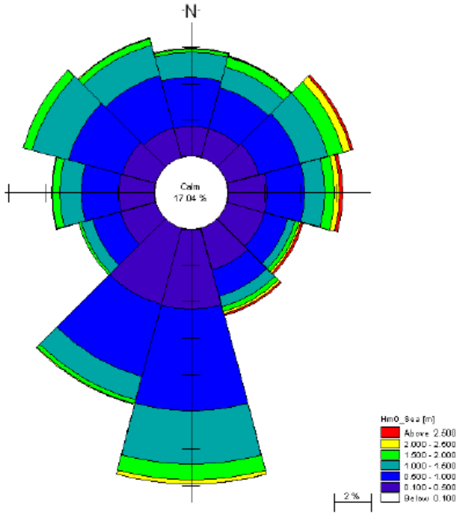


Figure 2-4: Wind Sea direction and height.

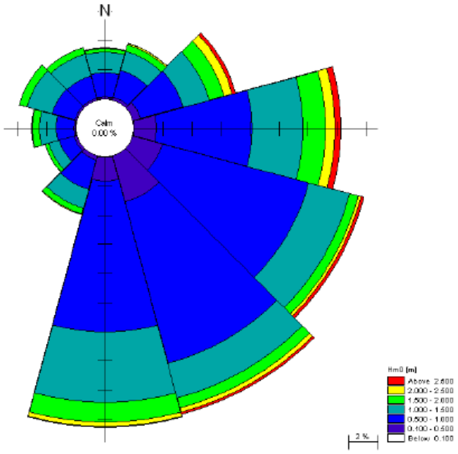


Figure 2-3: Total Significant Wave Height (Hs) direction and speed.

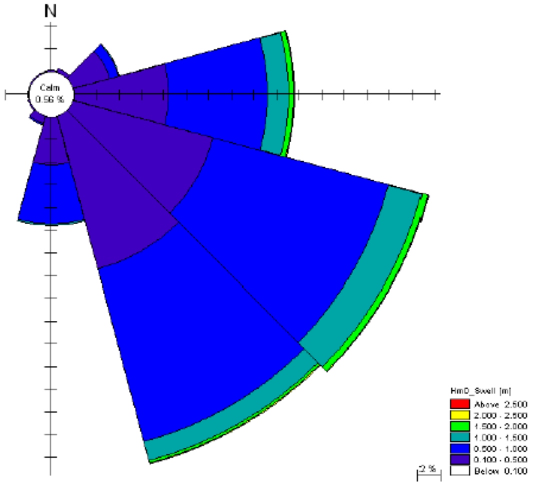
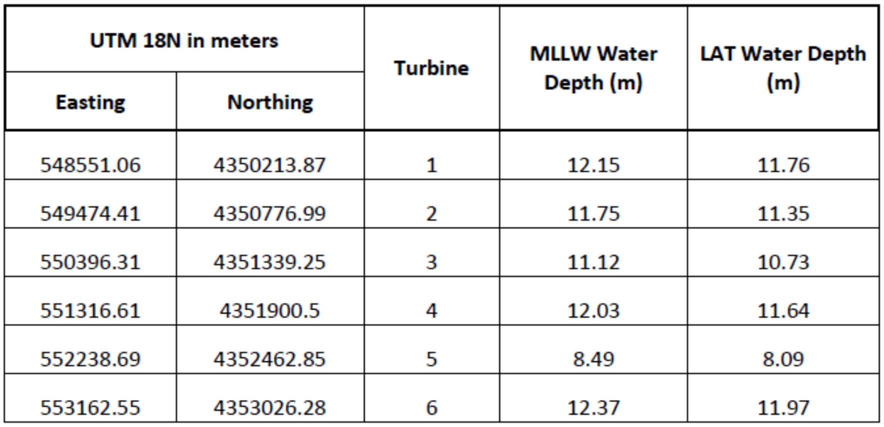


Figure 2-5: Rose plot of Hs swell.

The primary direction of offshore waves is from the southerly to southeasterly sectors, with more than 50% of all waves approaching from between 125° and 180°.

2.3.5 Topography and Bathymetry

A geophysical survey was conducted of the FACW site and the report is available as a separate document. The results show a smooth sandy seabed with small areas of seabed migration due to the near shore tidal activities and influences from the outflow of Absecon Inlet. The turbine site water depth varies between 12m at Turbine 6, to 8m at Turbine 5. The turbine 5 site is set on a shoal area which is subject to a sand borrow area by the ACOE for beach replenishment activities. Table 2-3 shows the water depths referenced to MLLW and LAT for each of the turbine locations:



UTM 18N in meters		Turbine	MLLW Water Depth (m)	LAT Water Depth (m)
Easting	Northing			
548551.06	4350213.87	1	12.15	11.76
549474.41	4350776.99	2	11.75	11.35
550396.31	4351339.25	3	11.12	10.73
551316.61	4351900.5	4	12.03	11.64
552238.69	4352462.85	5	8.49	8.09
553162.55	4353026.28	6	12.37	11.97

Table 2-3: FACW site bathymetry

Unless otherwise stated in contract documents or by request, the anticipated review cycle for submittals shall be 10 working days.

2.3.6 Geological Characteristics

Geological characteristics of the FACW site are available for review in the Geophysical Survey Report.

2.3.7 Biological Environment

Fishermen’s Energy has conducted an Essential Fish Habitat (EFH) Assessment of the FACW site. This report covers Benthic communities as well as different species living in the OWF area. The total impact to EFH is 4.2 acres of seabed area and the results of our assessment are available in the report and will not be covered here.

2.3.8 Avian Studies

Fishermen’s Energy has undertaken a two year pre-construction monitoring program that included vessel transects at the offshore site and shore-based radar studies to determine the presence and number of avian species at the project site. Endangered avian species were a target of interest for data collection during this program. Fishermen’s also conducted transects to search for bats using a blimp fitted out with acoustic detection equipment for bats. An Avian Radar was located at Steel Pier in Atlantic City which also scanned the area for avian species.

The result of our pre-construction monitoring activities is available in our pre-construction monitoring report. The submittal of this report to the ACOE resulted in a request from the US Fish and Wildlife Service (USFWS) for a biological assessment. This was submitted to the USFWS in April 2012 and resulted in a finding of “not likely to adversely affect” and final approval of our permit. The biological assessment is available for review upon request.

2.3.1 Marine Mammals

FACW have applied for and received an Incidental Harassment Authorization (IHA) Permit from the National Marine Fisheries Service (NMFS) for our construction activities. Our application provides details on the marine mammal types that were detected at our site and the potential for harm to these mammals based on our construction activities. Our application document is available for review.

2.4 Human Environment

2.4.1 Underwater Noise

Underwater noise to be encountered during construction activities is covered in our IHA permit application document.

2.4.2 Marine Archaeology

FACW have conducted a marine archaeology study as part of our geophysical survey. The scope of this investigation was developed using guidelines of the NJ State Historical Preservation Office and BOEM. No artifacts of historical or cultural significance were noted. Results are available in our Geophysical Survey Report.

2.4.3 Other Offshore Wind Farms

There are no other offshore wind farms to be constructed within the state waters limit of our site. The nearest wind farm that could be located to the FACW OWF is in federal waters and approximately 5 nautical miles from our location.

2.4.4 Marine Aggregate Extraction and Disposal Sites

Turbine site 5 is located within a borrow area for beach replenishment activities initiated by the ACOE. The site plan in Figure 2.2-1 shows hatched areas within the borrow area with the understanding by the ACOE to avoid dredging in these hatched areas due to our cables being placed there.

2.4.5 Shipping Activity

No major commercial shipping activities take place within the area surrounding the OWF. Commercial shipping consists of fishing vessels and tour boats. Other traffic is recreational fishing craft. FACW has conducted a Ship Collision Impact Study as a design basis input to the foundation design. This report is available upon request.

2.4.6 Pipelines and Cables

No pipelines or cables were discovered during the geophysical survey activities, which utilized sidescan sonar and sub-bottom profiling systems along the cable route and turbine array to a 500m corridor width.

2.4.7 Oil and Gas Exploration and Related Activities

No oil and gas exploration or other related activities will take place in the vicinity of the OWF.

2.4.8 Military and Civil Aviation/Activity

There are no military practice areas in the region of the FACW OWF site. There is a radar system operated by the DoD located 45 miles away in Gibbsboro NJ. The FACW OWF will have no impact on this radar system.

2.4.9 Commercial Fishing

The baseline assessment identified relatively low levels of commercial fishing within the general area of the FACW OWF site. Activity is predominantly by a limited number of locally based vessels deploying both static and mobile gears. The evidence obtained suggests that the static gear activity that does occur is mainly pot fishing and some occasional trawling. The towed gear activity that has occurred within the site area has for the most part been demersal otter trawling. Other fishing activities are recreational hook and line fishing.

Activity by foreign vessels does not occur within either the area of the site or over the export-cable route.

2.4.10 Marine Sanctuary

At the time of issue, the FACW OWF site was not located within any designated marine sanctuary areas.

3. Decommissioning

3.1 Wind Turbine Generators

The FACW OWF will be constructed using the Siemens 4.0-130 turbine. The turbine system consists of three blades attached to a nacelle housing the generator, gearbox and other operating and control equipment. The turbine nacelle will be supported by a tower consisting of three sections for a total height of 71.8m. The blade tip height will be 156m above MLLW and 24m above MHW to meet FAA and USCG permit conditions. The hub height at the center of the nacelle (rotor) will be 91.6m above LAT with a minimum spacing of turbines being approximately 1,080 meters.

The nacelle will have dimensions of 5.5m x 10.6m x 6.5m and will weigh approximately 220 metric tons. Components will include:

- Tower;
- Generator;
- Rotor (Hub);
- Nacelle Housing;

Key components of the tower section will include:

- Ladders;
- Lift;
- Power inverter;
- Power cable Control equipment;
- Bolts;
- Tower sections;

To lower the offshore risk, during decommissioning these components will be removed as whole sections and dismantled onshore.

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Figure 3-1: WTG typical installation.

3.2 Foundation

Steel Inward Battered Guide Structures (IBGS) will be used as foundations for the WTG's. Predicted dimensions and material requirements are set out in Table 3-1 followed by a foundation component layout in Figure 3-2.

IBGS Foundations	
Dimensions	Examples of the IBGS foundation dimensions are given below: • Width: 14 m • Overall length: ~33m • Sea bed penetration: 46m • Weight (guide structure):
Material Requirement	Typical amounts per foundation: • Steel: 705 mt
Seabed Preparation	Generally, will not be required, although some removal of obstructions may be required.

Table 3-1: IBGS Foundation weights and dimensions

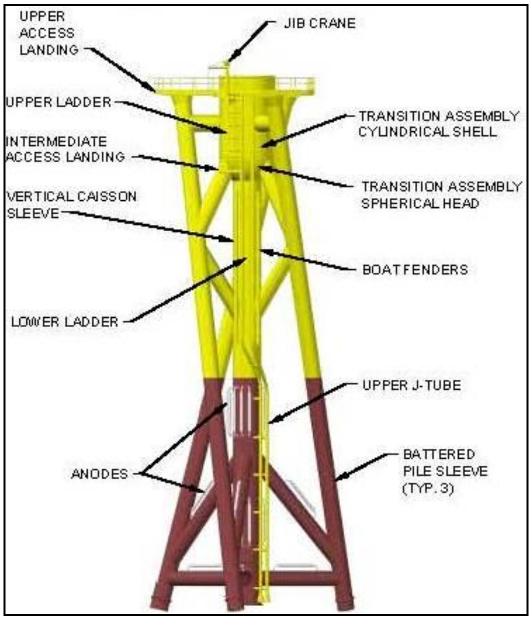


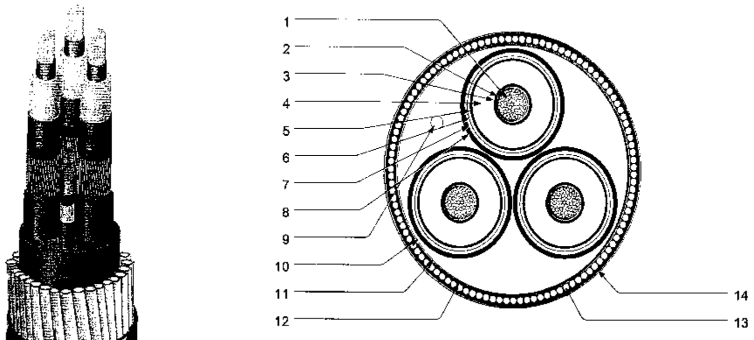
Figure 3-2: IBGS component layout

3.3 Export Cable

Electricity will be transmitted to shore by a 5.5km long 3/C armored submarine power cable of 34.5kV capacity and 600kcmil conductor size. The export cable will run from turbine #3 to a beach vault located at the foot of Tennessee Ave near the boardwalk in Atlantic City. The cable will be buried to a target depth of 3m, depending on localized seabed conditions. This will be achieved via a simultaneous lay and burial process using established cable installation tools.

3.4 Inter Array Cabling

The turbines will be connected to each other via a network of 4 inter-array cables. The inter-array cables will consist of 4/O size 3 core armored submarine power cables with a design voltage of 34.5kV. The total length of array cables for all phases will be approximately 4.6 km. Each inter-array cable will be fitted with a fiber optic component consisting of 24 fiber pairs for transmission of SCADA telemetry and other surveillance and control systems fitted to the turbines for remote command and control of the wind farm. Figure 3-2 shows the cross section and typical configuration of a submarine power cable.



(diagrammatic only – not to scale)

Layer description

1.	Conductor	8.	Anti-corrosion sheath
2.	Binder tape	9.	Optical unit
3.	Conductor screen	10.	Fillers
4.	Insulation	11.	Binder tape
5.	Insulation screen	12.	Armour bedding
6.	Water barrier	13.	Armour (galvanised steel wires)
7.	Metallic sheath	14.	Serving

Table 3-2: Typical submarine power cable configuration

3.5 Scour Protection

After evaluating site currents and bottom composition it has been determined that the IBGS foundation will not require scour protection in this environment.

4. Proposed Decommissioning Measures

4.1 Legislation & Guidance

The proposed decommissioning measures set out in the following section aim to adhere to the following key US/International legislation and/or guidance notes:

- Code of Federal Regulations: 30-CFR-285.103; 285.902; 285.906; 285.908;
- Offshore Wind Energy Installation and Decommissioning Cost Estimation in the US Outer Continental Shelf, BOEM report issued November 2010;
- United Nations Convention on the Law of the Sea (UNCLOS), 1982;
- State and Federal Health and Safety Regulations;

The FACW project is not subject to federal BOEM regulations as it is located within the state waters of New Jersey, however, we feel it prudent to use existing federal guidelines and regulations to form our decommissioning process and planning. The NJDEP and USACOE are clear in that the offshore wind plant is required to be decommissioned and FACW have included a preliminary decommissioning plan with our application for permits to construct.

4.2 Phasing and Coordinating Decommissioning

During the planning stages of decommissioning, FACW will phase the decommissioning process and look for potential partnerships where possible. This may minimize the costs for vessel transport, staff, and equipment and make greatest utilization of onshore handling facilities.

The following sections provide details of decommissioning for discrete elements of the FACW project.

4.3 Proposed Decommissioning of Turbines

Opportunities to re-use the generating equipment will be maximized wherever possible. Contractor health and safety recommendations and requirements of the time will be fully considered and factored in during planning of the decommissioning process.

The first phase of decommissioning is to prepare the site which will typically include;

- De-energize and isolate required electrical control and power cables from national grid;
- Removal of all loose items from the structure;
- Containment and removal of liquids such as lube oils/transformer liquids etc.;
- Installation/certification of lifting points; and
- Hot bolting key bolts to aid unbolting process.

Once the preparation has been completed, it is expected that each remaining structure will be removed by crane in reverse process of their installation as follows:

A	Removal of the three individual turbine blades
B	Disconnection/removal of nacelle and turbine.
C	Cut tower at transition piece and remove to jack-up vessel.
D	Cut transition piece connection to foundation guide structure and remove to materials barge. Cut pilings 15 feet below the seabed and remove to materials barge.
E	Remove all components onshore to an appropriate handling facility and disassemble all parts to sizes suitable for reuse, recycling or disposal as follows: i. Removal of all hazardous substances and fluids from the turbines (e.g. oil reservoirs and hazardous substances) to be disposed of in accordance with relevant regulations at the time of decommissioning. ii. All steel components sold for scrap to be recycled. This forms the bulk of the structures and substructures. iii. The fiberglass turbine blades will be disposed of in accordance with relevant regulations at the time of decommissioning.
F	Cut turbine interconnecting cables adjacent to the substructures. Buried cables will be left in situ.

Table 4-1: FACW decommissioning process phases

4.4 Proposed Decommissioning of Foundations and Transition Pieces

Offshore windfarm design codes and standards limit the ability to reduce steel thicknesses to make structures lighter for ease of removal. The foundation pilings will not be practically removed entirely from the seabed once piled to the design penetration depth. It is therefore suggested to remove the pile to a depth of 15 feet below the seabed, which is in line with current permit conditions and federal regulation.

The pilings will be removed by cutting at an appropriate depth such that any part of the pile remaining in the ground is likely to be covered by seabed sediment. On current knowledge, high pressure abrasive water jet cutting is likely to be the preferred method. The final method chosen shall be the least damaging to the surrounding seabed and the most environmentally acceptable means available. The use of divers for any removal works will be minimized and if possible avoided completely.

The general target for cutting is 15 feet (4.6m) below the seabed per the current BOEM standard and USACOE permit condition. When assessing the possibility of cutting below the seabed it is important to consider the need to overcome frictional forces acting on the piles.

The removal of the piles would take the place in the following manner:

A	The seabed within the pilings will be excavated to approximately 1m below required cutting depth. Excavated sand and silt, through which the pile was originally driven, will be disposed of on the seabed adjacent to the pile. Such material is native to the area and can therefore be considered uncontaminated.
B	A remotely operated high pressure water/grit cutting tool will be set up within the piling at the appropriate cutting depth.
C	Pilings and guide structure pieces will be rigged up onto the decommissioning vessel crane.
D	Pilings will be internally circumferentially cut at appropriate depth.
E	Upper cut section of pilings (including transition piece), once cut free, will be lifted out of water and placed onto a floating materials barge.
F	Batch of recovered piling sections are to be transported to shore for recycling.

Table 4-2: Proposed decommissioning process for FACW foundations

The seabed soils around the pilings may have become consolidated and (depending on depth of cut) require significant crane capacity to remove. In the worst case, it may be necessary to use vibratory hammers as part of removal process to assist in separating the seabed soil from the pilings. The following bullets provide a brief description of two alternative methods of cutting the pilings:

- Wire Cutting - This involves cutting through the piling with steel cutting wire. The cut would be carried out from the outside of the pile, requiring external excavation to an appropriate cutting depth.
- Explosives - Explosive cutting is also a well-known method but it is not expected to be first choice

4.5 Proposed Decommissioning of Marine Export and Inter-Array Cables

The intention would be to only remove those offshore cables, sections of offshore cables or cable ends which are uncovered at the time of decommissioning. This will be determined by survey prior to decommissioning of the site. This intention is based on the aim of minimizing environmental disturbance to the site.

Cables in this category will be removed by lifting cable ends onto the cable retrieval vessel and cut into 3 meter sections suitable for scrapping ashore. There is no intention to leave any unburied cables on the seabed surface.

Any cable requiring removal will be cut as close to the foundation as possible, with the ends weighted down and buried to a proposed depth of 1m below seabed level. Recovered cable will be cut in 3m lengths and recycled at appropriate recycling facilities.

Any sub-sea trenches left after cable removal will be filled by natural tidal action. Exposed cable ends where a foundation has been removed will be weighted down and buried to a 1m depth. The reburying of cut cable ends is likely to be carried out by divers or remotely operated vehicles.

4.6 Scour Protection

Based on engineering evaluations of the ocean currents and bottom sediment composition, the installation of scour protection around the FACW structures will not be required.

4.7 Proposed waste Management Solutions

FACW will pay full regard to the “waste hierarchy”, which suggests that reuse should be considered first, followed by recycling, incineration with energy recovery and, lastly, disposal. In any event, waste management will be carried out in accordance with all relevant legislation at the time of decommissioning and it would be intended that any disposal took place on land.

Waste Type	Disposal	Recycle	Re-Use
Steel from Foundations		Scrap	
Steel from WTG		Scrap	
Copper from power cables		Scrap	
GRP from blades		Scrap	
Used lubricants from wind turbine		Recycling	
Non-recyclable materials and fluids	Landfill		

Table 4-3: Proposed waste management solutions for key FACW OWF project elements

4.8 Lighting and Marking

FACW is committed to exhibiting the appropriate marks and lights during the decommissioning of the wind farm. In regard to aviation safety, the shape color and character of the lighting will be compliant with the permit conditions issued for the operation of the OWF.

In relation to navigational safety, lights and marks will be agreed in consultation with the USCG which will be consulted prior to decommissioning to specify any obstruction marking that may be required during the removal operations. In the event that any obstruction is left on site that may be considered to present a hazard to navigation, FACW will provide the necessary marking specified and maintain the marking until the obstruction is no longer a danger to navigation

5. Environmental Assessment

The USACE completed an EA for the FACW project in 2010. The resulting EA was submitted as part of the permit application. To remain consistent with the commitment to undertake reviews of this document, it is proposed that the existing EA for the project is also reviewed throughout the project's lifetime. Once the final decommissioning measures are known, the FACW EA will be reviewed to assess the potential impacts that may arise and which were not covered in the initial EA process. At this point a decision will be made as to whether a more detailed assessment is required. Key criteria that will inform this decision include

- An updated review, identification and assessment of potential impacts on the environment.
- An updated review, identification and assessment of potential impacts relating to interference with other legitimate users of the sea. It is possible that the nature and/or intensity of human activities taking place on/around the FACW site such as commercial fishing may have changed over the lifetime of the project. A review will be undertaken to identify those activities with potential to be affected by decommissioning.
- An updated review, identification and assessment of the potential impacts of decommissioning on the local community, i.e. potential socio-economic impacts.
- An updated review, identification and assessment of potential impacts on historic environment interests, in particular marine archaeological features.

Potential impacts upon the physical and biological environments will also be assessed. Specific potential impacts such as physical and biological disturbance to shellfish beds within the site, and/or any disruption to fishing activity targeted at these beds, shall be fully investigated. Surveys in and around FACW that could inform this process could include:

- Benthic grab/trawl surveys;
- Geophysical surveys (side scan sonar);
- Ornithological (boat-based surveys);
- Marine Mammals: should decommissioning activity result in high noise levels, it may be appropriate to survey marine mammal activity or establish exclusionary zones for areas where sound levels will exceed maximum tolerance for marine mammals.

If required, an EA specifically covering the decommissioning process will be prepared that will fill in any gaps in relation to the above. Any additional EA will:

- Identify and assess potential impacts on the environment; Identify surveys to inform the assessment process;
- Review nature conservation designations in the area;
- Identify and assess potential impacts on the historic environment;
- Assess the potential interference with other legitimate users of the sea;
- Identify and assess potential impacts on amenities, communities and future uses of the environment;
- Describe the detailed measures to avoid, reduce and if possible, remedy any significant adverse effects indicated;

Some of these key criteria may change in emphasis over time and the EA will need to recognize and examine such changes.

The use of explosives is not proposed at any stage of the decommissioning works. However, should they be necessary during the course of decommissioning, the potential impact of these on marine life, particularly marine mammals, will be assessed. Should the need to use explosives arise, a comprehensive mitigation strategy will be proposed following all appropriate guidelines and regulations such as those set out by the various federal stakeholders and state DEP

6. Consultations with Key Stakeholders

FACW has maintained a high level of consultation with key stakeholders, both at a local and national level. FACW is committed to ensuring that this level of consultation is continued throughout the on-going construction phase, as well as during decommissioning.

FACW intends to consult the following organizations (Table 6-1) on the draft FACW decommissioning plan.

USACOE Philadelphia District	NOAA/NMFS	USFWS
NJDEP	USCG District 5	EPA

Table 6-1: List of organizations consulted on the FACW decommissioning plan

In addition to consultation with these bodies, FACW also proposes to maintain close consultation with the local fishing industry.

Noting the long period between the production of this decommissioning plan and the actual decommissioning process itself, FACW commits to undertaking a further round of consultation with stakeholders which will be carried out two years prior to decommissioning. An updated decommissioning program will be produced at that time with all the stakeholders listed in Table 6-1 consulted as part of the process.

7. Costs and Schedule

Fishermen’s Energy has not conducted a specific study to identify the decommissioning costs for the FACW wind farm. Instead, we have used parametric estimating based on known unit costs for marine services for turbine & foundation installation as well as cable installation. Costs are based on 2012 rates.

On the basis of the durations in the schedule in section 9, cost projections (Table 7-1) have been developed for the decommissioning activity including vessel time and ancillary activities. It should be noted that the cost structure assumes scrap value being returned to the decommissioning vendor and then credited back to FACW.

Although our current plan is to leave the buried cables in place, for costing purposes we have assumed that removal of the cable will be required in the future and as such have included this as part of our basis of estimate.

Decommissioning Workbreakdown - XEMC Case

Item	Category	Description	Unit Cost	Units	Number of Units	Cost
1	Turbines	Removal of 5 turbine structures.	$ 149,342	days	12	$ 1,792,104
2	Foundations	Removal of 5 foundations 15' below mudline. Includes crew & tool for steel cutting below mudline.	$ 154,342	days	12	$ 1,852,104
3	Cable	Removal of cables.	$ 100,804	days	9	$ 907,236
4	Mob/demob	Mob/demob of turbine/foundation & port resources	$ 2,650,000	lot	1	$ 2,650,000
5	Mob/demob	Cable barge mob/demob	$ 2,222,000	lot	1	$ 2,222,000
					Sub-Total:	**$ 9,423,444**
7	Salvage Value - Steel	Scrap value for foundations and tower.	$ 285	ton	5,140	$ (1,464,758)
8	Salvage Value - Copper	Scrap value for insulated copper wire.	$ 2.56	lbs	178,850	$ (457,856)
					Total Including Salvage Value:	**$ 7,500,831**

Table 7-1: FACW decommissioning costs

The estimated cost of removing a wind turbine and associated foundation and cabling is just under $1.9 million per turbine. Taking a scrap value credit into account the per turbine cost is $1.5 million.

8. Financial Security

FACW have setup a financial security mechanism with a decommissioning reserve fund included in the Finance Plan. This decommissioning reserve fund accrues money annually for the first 15 years. The present value of decommissioning has been escalated 20 years into the future at a rate of 3% per annum. The amount of decommissioning reserve accrued in 15 years will be sufficient to cover OWF decommissioning costs in year 20.

The security will be reduced to the extent that funds have been expended and released in full once any repowering activity is committed or decommissioning is complete.

To the extent that the asset is repowered, the decommissioning reserve will be built up again from year 20 after repowering in the same manner.

The form of security to be posted has not yet been finalized, but would be a combination of letters of credit and cash. It is likely that letters of credit will initially be used to avoid excessive costs of capital with cash balances being reserved towards the end of the operating life.

9. Decommissioning Schedule

It is difficult to determine the decommissioning schedule prior to construction, as unforeseen issues can arise during the installation and operation of the wind farm that ultimately could affect the decommissioning. At the time of writing, no offshore wind farms worldwide have been decommissioned, so knowledge of the operational challenges is limited. Information gathered during construction and operation of the FACW Wind Farm, and information available from the decommissioning of other wind farms will provide valuable insight into the timing, costs and operational challenges faced for such a project. To this end a review of the final decommissioning program is suggested prior to decommissioning the FACW OWF.

It is proposed that a final decommissioning program will be prepared 2 years prior to closing down the wind farm. The final decommissioning program is expected to include references to relevant surveys performed during the construction phase and during the operational phase.

Other reviews, such as reviews of the financial security provisions within the plan, are likely to be necessary, the frequency of which will be dependent on how the financial security provisions perform within the context of, for example, market conditions and the technical performance of the wind farm. A further review will also be undertaken after any significant re-engineering works.

The key phases of decommissioning, and the time periods associated with each phase, are currently estimated as follows:

- Decommissioning EA and consultation phase – 12 months
- Project management, planning, procurement and contract follow-up – 12 months
- Offshore decommissioning – 2 months

The schedule of works will be determined once the final review of this document is completed.

10. Project Management

Once the wind farm is nearing the end of its agreed operational life, FACW will initiate a final review of this document and the proposed program of work. Once this review is complete a Final Decommissioning Program will be developed outlining the discrete methods, measures and timing that will be employed.

A final Decommissioning Report will be submitted to the appropriate regulatory authorities once decommissioning is complete.

11. Seabed Clearance and Verification

FACW proposes to clear the seabed in accordance with the provisions made in this decommissioning program and to collect and provide evidence to reflect this.

Following decommissioning, a range of surveys will be carried out to show that the site has been cleared. These surveys are likely to include sidescan, magnetomer and bathymetric surveys, with possible use of drop-down video or ROV to ground truth the data where necessary. It is currently proposed that these surveys would be commissioned directly by FACW and undertaken by an established marine survey company. These surveys will enable identification and subsequent recovery of any debris located on the sea-bed which may have arisen from activities related to the FACW OWF, and which may pose a risk to navigation, other users of the sea or the marine environment.

The area to be covered will be determined prior to decommissioning, but FACW is aware of the guidance for oil and gas installations which specifies a 500m radius around any installation.

Analysis of the survey data will also ensure that items for removal and disposal relate only to the wind farm. The appropriate competent authority will be approached regarding the identification of other anomalies that may be of archaeological interest.

12. Restoration of the Site

FACW is committed to restoring the OWF site, as far as it is reasonably practical, to the condition that it was in prior to construction. Consistent with the decommissioning provisions detailed above, the key restoration work will relate to:

- Ensuring that all foundations cut below the seabed are made safe and adequately covered, and;
- Ensuring that no inter-array cables are left exposed on the seabed and that all cable ends are adequately buried.

Active restoration by mechanical excavation and extraction is not considered as it would pose an unnecessary risk to personnel and the environment. Letting the seabed self-settle is sufficient and in proportion to the limited environmental impact of the proposed decommissioning. This latter approach is also proposed with respect to the in-filling of any scour pits left after the main decommissioning works. Any scour pits that form in this area will have been produced due to the presence of the piling structures acting on local hydrodynamic processes. Upon removal of these structures, it is predicted that the localized effects of these processes will no longer be present and the scour pits will infill naturally.

13. Supporting Studies

The following documents inform and support the decommissioning provisions contained in this document:

I. New Jersey Department of Environmental Protection – Ocean/Wind Power Ecological Baseline Studies, Final Report, July 2010.
II. BOEMRE – Offshore Wind Energy Installation and Decommissioning Cost Estimation in the US Outer Continental Shelf; Kaiser and Snyder, November 2010.
III. Atlantic City Offshore Windfarm Design Metocean Data Report rev2; Rambøll, August 2011.
IV. Geotechnical Data Report for the Proposed Six Turbine Offshore Demonstration Scale Wind Farm; Langan Engineering and Environmental Services, December 2010.
V. Marine Geophysical Survey in Support of an Offshore Wind Farm and Cable Route Construction; Alpine Ocean Seismic Survey, May 2011.
VI. Aquatic Resources Impact Assessment of the FACW 25MW Wind Farm Project, AMEC, February 2010
VII. Avian Risk Assessment for the FACW Offshore Wind Project revised, Curry & Kerlinger, August 2011.
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