SIMULATIONS

016 Oak Island
Late Afternoon
VISUALIZATION STUDY FOR
OFFSHORE NORTH CAROLINA

SIMULATION

016 Oak Island
Late Afternoon
Siemens SWT-3.6-107
10 nm
Simulation
016 Oak Island
Late Afternoon
Siemens SWT-3.6-107
10 nm

GENERAL INFORMATION

Base Photograph
Photo Name: OIA_0503-UV2
Date: April 14, 2012
Time: 6:12 PM
GPS Coordinates: lat 33.913987°, long -78.161383°
Viewpoint Elevation: 3'

Sun and Weather
Sun Angle/Azimuth: 277°
Sun Elevation: 7°
Lighting Angle: Side lit
Weather Conditions: Partly cloudy
Visibility: 10 mi
Wave Height: 4'
Period: N/A

Camera
Camera Make/Model: Nikon D7000
Sensor Dimensions: 23.6 mm X 15.6mm
Lens Make/Model: Nikkor DX AF-S 35 mm
Lens Focal Length: 35 mm
35 mm Equivalent Focal Length: 52.5 mm
Horizontal and Vertical Angles of View:
37.3° wide and 25.3° high
Camera Height: 1.5 m (5')
Camera Azimuth: 214°

Wind Turbine Information
Number: 200
Make and Model: Siemens SWT-3.6-107
Height/Dimensions:
Support Structure/Monopile Ht.: 13 m (43')
Hub Ht. (above Monopile): 80 m (262')
Rotor Diameter: 107 m (351')
Total Height to Tip of Blade: 147 m (481')
Service Platform: A bldg. 50'H X 100'W X 200' L
elevated 50' above the water

VIEWING INSTRUCTIONS

The simulation is properly printed on an 11" X 17" sheet at actual size. If viewed on a computer monitor, use the highest screen resolution.
The simulated image is at the proper perspective when viewed at 23.5" from the eye, or at a distance of approximately twice the image height.

NOTES

- The image was taken with a UV filter.
- Refraction Coefficient\(^4\) (k) = .075

PANORAMA

Simulation location within the panorama view (190° X 55°)
from the Oak Island site
VISUALIZATION STUDY FOR
OFFSHORE NORTH CAROLINA

SIMULATION

016 Oak Island
Late Afternoon
Siemens SWT-3.6-107
15 nm
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Simulation location within the panorama view (190° X 55°)
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016 Oak Island
Late Afternoon
Vestas V164-7.0 MW
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Wind Turbine Information
Number: 200
Make and Model: Vestas V164-7.0 MW
Height/Dimensions:
- Support Structure/ Monopile Ht.: 13 m (43')
- Hub Ht. (above Monopile): 105 m (345')
- Rotor Diameter: 164 m (538')
- Total Height to Tip of Blade: 200 m (656')
- Service Platform: A bldg. 50' H X 100' W X 200' L
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T. J. Boyle Associates
landscape architects • planning consultants
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Vestas V164-7.0 MW
20 nm
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**016 Oak Island**

**Late Afternoon**

Vestas V164-7.0 MW

20 nm

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**Simulation location within the panorama view (190° X 55°) from the Oak Island site**

T. J. Boyle Associates
landscape architects • planning consultants
1**GPS Coordinates**
Location coordinates as used in WindPRO to register the wireframe diagram to the photograph. Due to slight errors and lens distortion, these values may differ at the fourth significant digit as obtained from a handheld GPS device at the time the photographs were taken and as shown on the Project Location Map.

2**Visibility**
Visibility is obtained from the closest airport weather station (see chart at right). The chart shows which weather station was used for each site. Visibility is measured up to ten statute miles.

3**Camera Azimuth**
Camera azimuth was obtained using a magnetic compass at the time of photography. However magnetic anomalies in the study area make some of these measurements unreliable. The camera azimuth reported here is for true north and reflects the bearing used to register the wind turbines to the photograph in WindPRO.

4**Refraction Coefficient**
The correction for refraction comes from Technical Appendix F Earth Curvature and Refraction of Light, in the report *Visual Representation of Windfarms Good Practice Guidance*, prepared for Scottish Natural Heritage (h+m 2006). The coefficient of refraction $k$ is commonly defined as the ratio between the radius of the earth and the radius of the light in the line of sight between an object and the observer (Hirt 2010). The value reported here is half this value, but it is multiplied by two in the Technical Appendix’s equation.

### Closest Airport Weather Station to Sites

<table>
<thead>
<tr>
<th>Site</th>
<th>Weather Station Location NC</th>
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<tbody>
<tr>
<td>001 Corolla Lighthouse</td>
<td>Kill Devil Hills</td>
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<tr>
<td>002 Beach at Duck</td>
<td>Kill Devil Hills</td>
</tr>
<tr>
<td>003 Kitty Hawk</td>
<td>Kill Devil Hills</td>
</tr>
<tr>
<td>004 Coquina Beach</td>
<td>Kill Devil Hills</td>
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<tr>
<td>005 Bodie Island Lighthouse</td>
<td>Hatteras</td>
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<tr>
<td>006 Cape Hatteras Lighthouse</td>
<td>Hatteras</td>
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<tr>
<td>007 Lighthouse Beach</td>
<td>Hatteras</td>
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<td>008 Ocracoke Beach</td>
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<td>011 Great Island Camps</td>
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<td>012 Cape Lookout Lighthouse</td>
<td>Beaufort</td>
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<td>013 Cape Point</td>
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<td>015 Bald Head Island</td>
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<tr>
<td>017 Holden Beach</td>
<td>Southport</td>
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<td>018 Sunset Beach</td>
<td>Southport</td>
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</tbody>
</table>

### ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
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<tbody>
<tr>
<td>nm</td>
<td>nautical miles</td>
</tr>
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<td>mm</td>
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<td>long</td>
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### REFERENCES
