SIMULATIONS

017 Holden Beach
Starlit Night
017 Holden Beach
Starlit Night
Siemens SWT-3.6-107
10 nm
Simulation
017 Holden Beach
Starlit Night
Siemens SWT-3.6-107
10 nm

GENERAL INFORMATION

Base Photograph
Photo Name: HBS_0588
Date: April 14, 2012
Time: 9:08 PM
GPS Coordinates¹: lat 33.910182°, long -78.304541°
Viewpoint Elevation: 3’

Weather
Moon is below horizon
Weather Conditions: Starlit with scattered clouds
Visibility²: 10 mi
Wave Height: 1 - 1.5’
Period: 9 sec.

Camera
Camera Make/Model: Nikon D7000
Sensor Dimensions: 23.6 mm X 15.6 mm
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 Azimuth³: 199°

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 simulated light is derived from a photograph of an LED L-864 FAA warning light taken at Lempster, NH on a clear night from a distance of 15 nm. The photograph of the light as displayed on a Lenovo W520 laptop computer at a screen resolution of 1600 X 900 was compared to the light as actually seen. The selected image most closely captured what was actually seen.
  • Refraction Coefficient⁴ (k) = .075

PANORAMA

Simulation location within the panorama view (190° X 60°)
from the Holden Beach site
Simulations

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Siemens SWT-3.6-107
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Simulation location within the panorama view (190° X 60°)
from the Holden Beach site

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T. J. Boyle Associates
landscape architects • planning consultants
VISUALIZATION STUDY FOR
OFFSHORE NORTH CAROLINA

SIMULATION

017 Holden Beach
Starlit Night
Vestas V164-7.0 MW
10 nm
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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
  elevated 50' above the water

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landscape architects • planning consultants
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### 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.

### ABBREVIATIONS

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