# EXHIBIT J

# **Proposed Wind Generation Project**

## Wind Prospect 178 New Haven Road Prospect, Connecticut

Prepared for



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VHB

## Visual Resource Evaluation

BNE Energy Inc. ("BNE") seeks to construct a wind generating facility ("Facility" or "Wind Prospect Facility") on property located at 178 New Haven Road (identified herein as the "host property") in the Town of Prospect, Connecticut. This Visual Resource Evaluation was conducted to evaluate the potential visibility of the Facility within a five-mile radius of the proposed host property ("Study Area"). The Study Area also includes land located within the neighboring municipalities of Bethany, Hamden, Cheshire, Waterbury, Naugatuck and Beacon Falls. Figure 1 (*Site Location Map*) depicts the proposed location of the Facility and the limits of the Study Area.

### **Project Introduction**

BNE proposes to install two General Electric ("GE") 1.6 megawatt ("MW") wind turbines at the host property, one in the southwest corner and one in northwestern portion of the parcel. The hub height of the GE turbines would be 100 meters (328 feet). The blade diameter of the GE turbines would be 82 meters (269 feet), up to a maximum of 100 meters (328 feet) if an alternative model turbine is installed. Aviation lighting in the form of a low intensity red strobe would be required for illumination at night on the hub of each of the turbines. In addition to the two turbines, Wind Prospect will include associated ground equipment including an electrical collector yard and associated utility infrastructure so that the turbines can be interconnected to the electrical grid. The turbines would be located at ground elevations of approximately 640 and 762 feet Above Mean Sea Level ("AMSL"), respectively.

### Site Description and Setting

Identified in the Town of Prospect land records as map 112, block 96, lot 178, the host property consists of approximately 67.5 acres of mostly undeveloped land with a 160-foot tall telecommunications tower located in the southeast portion of the parcel. The host property is abutted to the west by the Naugatuck Reservoir and associated water company property, which encompasses nearly 500 acres of undeveloped land. Land use within the general vicinity of the host property is comprised of mixed commercial and residential development. New Haven Road (State Route 69) extends in a north to south direction immediately east of the host property.

The topography within the Study Area is generally characterized by gently rolling to steep hills with ground elevations that range from approximately 90 feet AMSL to approximately 905 feet AMSL. The tree cover within the Study Area consists mainly of mixed deciduous hardwood species that occupy approximately 36,191 acres of the 51,692 -acre study area (70%). The average tree canopy height throughout the Study Area was conservatively estimated to be approximately 65 feet.

### METHODOLOGY

To evaluate the visibility associated with the proposed Facility, VHB used a predictive computer model that provides an assessment of potential visibility throughout the entire Study Area. A description of the procedures used in the analysis is provided below.

VHB uses ArcGIS® Spatial Analyst, a computer modeling tool developed by Environmental Systems Research Institute, Inc., to calculate the areas from which at least the top of the proposed Facility (hub height) is expected to be visible. Project- and Study Area-specific data were incorporated into the computer model, including Facility height, its ground elevation, underlying and surrounding topography and existing vegetation. Information used in the model included Connecticut LiDAR<sup>1</sup>-based digital elevation data and model and a digital forest (or tree canopy) layer developed for the Study Area. The LiDAR-based Digital Elevation Model (DEM) represents ten-foot spatial resolution elevation information for the state of Connecticut that was derived through the spatial interpolation of airborne LiDARbased data collected in the year 2000 and has a horizontal resolution of ten (10) feet. The data was edited in 2007 and made available by the University of Connecticut through its Center for Land Use Education and Research (CLEAR). To create the forest layer, mature trees and woodland areas depicted on aerial photographs (ranging in dates from 2004 to 2008) were manually digitized (hand traced) in ArcGIS®, creating a geographic data layer for inclusion in the computer model. The black and white, digital aerial photographs, obtained from the Connecticut Department of Transportation, were flown in the spring of 2004 and selected for use in this analysis because of their image quality and depiction of pre-leaf emergence (i.e., "leaf-off") conditions. These photographs are half-foot pixel resolution. The more recent aerial photographs (2006 and 2008) were overlaid and evaluated to identify any new development resulting in the removal of trees.

Once the specific data layers were entered, the ArcGIS® Spatial Analyst Viewshed tool was applied to achieve an estimate of locations where the proposed Facility could be visible. First, only topography was used as a possible visual constraint; the tree canopy was omitted to evaluate potential visibility with no intervening vegetative screening. The initial omission of this data layer resulted in an excessively conservative prediction, but it provided an opportunity to identify areas within potential direct lines of sight of the Facility.

The average tree canopy height within the Study Area, in this case 65 feet, was determined based on information collected in the field using a combination of a hand-held laser range finder, clinometer and comparative observations. The 65-foot forest data layer was then built into the DEM to establish intervening vegetation for display on the viewshed map. The forested areas were overlaid on the DEM with a height of 65 feet added to the base elevation and the visibility within the Study Area calculated.

LiDAR is an acronym for Light Detection and Ranging. It is a technology that utilized lasers to determine the distance to an object or surface. LiDAR is similar to radar, but incorporates laser pulses rather than sound waves. It measures the time delay between transmission and reflection of the laser pulse.

As a final step, the forested areas were extracted from the areas of visibility, using a conservative assumption that a person standing within the forest will not be able to view the proposed Facility beyond a distance of approximately 500 feet. Depending on the density of the intervening tree canopy and understory of the surrounding woodlands, it is assumed that some locations within this distance could provide visibility of at least portions of the proposed Facility at any time of the year. In "leaf-on" conditions, this distance may be overly conservative for most locations. However, for purposes of this analysis, it was reasoned that forested land beyond 500 feet of the proposed Facility would consist of light-impenetrable trees of a uniform height.

Visibility varies seasonally, primarily with increased views occurring through the leafless trees and understory. During "leaf-off" conditions, mast or pole timber and branching provide the majority of screening. Because each site has distinctive forest characteristics, modeling for seasonal variations of visibility becomes problematic. In our experience, even when incorporating conservative constraints into the model, the results over predict seasonal visibility. Because each Study Area includes mature vegetation with unique and variable tree spacing, dimensions and branching patterns, creating a realistic, Study Area-specific "leafoff" tree density data layer that is not possible. Eliminating the tree canopy altogether, as performed in our initial analysis described above, exaggerates areas of visibility because it assumes unobstructed sight lines from numerous areas. For example, some locations at similar ground elevation as that of the proposed Facility and separated from the project site by 500 or more feet of intervening forest or woodland vegetation, could likely be obstructed by the combined mass of variable tree trunk and limb patterns. To provide an estimate of seasonal visibility through the trees, the forest data layer was manipulated to eliminate a 500foot wide perimeter of vegetation. Using this approach, potential seasonal visibility could occur from some (but not all) locations within this presumed leafless corridor.

Also included on the view shed mapping is a data layer, obtained from the State of Connecticut Department of Environmental Protection ("CTDEP"), which depicts various land and water resources such as parks and forests, recreational facilities, dedicated open space, CTDEP boat launches and other categories. Lastly, based on a review of published information, it was determined that no State-designated scenic roadways are present within the Study Area.

BNE intends to install two turbines at heights of 100 meters with blade lengths of 41 meters. However, there is the potential for 50-meter blades to be installed. For purposes of this analysis, the 50-meter blade length was used to present the highest potential scenario. Three view shed maps were created for purposes of analyzing the potential visibility of the Facility and are included as attachments to this report, including:

• Figure 2 (*Year-Round Visibility*) depicts the potential year-round (leaf-on) visibility of the Facility, including separate estimates of both the turbine hub heights (100 meters/328 feet) and combined turbine and blade apex heights of 150 meters (492 feet), based on a 100-meter blade rotor diameter (50- meter/164-foot length), within the Study Area;

- Figure 3 (*Hub Height Visibility*) depicts the potential year-round (leaf-on) and seasonal (leaf-off) visibility of the turbine hub heights within the Study Area; and,
- Figure 4 (*Visibility Within One Mile*) depicts the potential year-round visibility of the turbine hub and hub plus blade apex heights, and the seasonal visibility of the hub height, within one (1) mile of the host property.

## **Photographic Simulations**

Photographic simulations were generated at three locations where the Facility would be visible, representing distances of 0.25 mile, 1.8 miles and 3.2 miles from the proposed Facility. The photographic simulations portray a scaled rendering of the proposed Facility from these locations. Using field data, site plan information and 3-dimension (3D) modeling software, a spatially referenced model of the site area was generated. At each location, information was collected including the geographic coordinates (latitude and longitude) of the camera's position, angle of camera view, height of camera, weather and time of day, and logged using a combination of Trimble and Arcpad field equipment utilizing global positioning system [GPS] technology.

The locations of the photographs are included on the view shed map.

The photographs used in the simulations were obtained from the following areas:

- George Street at Route 69 (Prospect)
- Naugatuck State Forest Vista Area (Naugatuck)
- Adjacent to #4 Smokerise Circle (Prospect)

Photographs were taken with a Nikon D-80 digital camera body and Nikon 18 to 135 mm zoom lens. For the purposes of this report, the lens was set to 50mm. "The lens that most closely approximates the view of the unaided human eye is known as the normal focal-length lens. For the 35 mm camera format, which gives a 24x36 mm image, the normal focal length is about 50 mm.<sup>20</sup> Given the relative proximity of View 1 to the proposed Facility (approximately 0.25 mile away), photographs and simulations have been provided using both a standard 50 mm focal length and an 18mm focal length in order to provide a greater depth of field.

Preparation of the photographic simulations began with the creation of a spatially-referenced 3D computer model of the proposed project area which includes the proposed turbines, surrounding land formations, and any structures that assist in linking the project photography with the 3D computer model such as existing communication towers and/or existing buildings/homes in cases when their global position can be verified. For example, in view 3, existing telecommunications towers are visible and were used to further ensure accuracy of the simulation. The information recorded by the photographer was used to set up a virtual camera within the 3D computer model replicating the exact position of the

<sup>&</sup>lt;sup>2</sup> Warren, Bruce. *Photography*, West Publishing Company, Eagan, MN, c. 1993, (page 70).

camera when in the field. Photo simulations were then created using a combination of renderings generated in the 3D model and photo rendering software programs.

### CONCLUSIONS

The results of this analysis indicate that a total of 160<u>+</u> acres within the Study Area would have some visibility of the turbine hub above the tree canopy year-round. This represents less than one-half of one percent of the 51,692-acre Study Area. At its apex, the blade(s) may be visible above the tree canopy from within approximately 347 acres (less than one percent of the Study Area). The majority of potential year-round views of the turbine hub would occur on the host property and the adjacent New Naugatuck Reservoir. Brief views may also be achieved from select locations along New Haven Road and higher elevations to the east. Views would be limited to the west beyond the adjacent water company land, generally occurring at higher elevations, including a portion of the Beacon Cap Trail (a spur trail that extends off the Naugatuck Trail, part of the Connecticut Blue-blaze system), as demonstrated in View 3.

Using the conservative methodology for predicting seasonal visibility, we estimate that approximately 1,164 acres (representing approximately 2% of the Study Area) have the potential to offer some views of the Facility hubs through the trees during leaf-off conditions. Most of the potential seasonal visibility occurs on and within approximately one mile of the host property, primarily extending offsite to the east and west. It must be noted that the predicted seasonal visibility acreage represents a conservative, and likely over-predictive, total area. The results are based on the assumptions discussed previously and should be interpreted as representing areas where the potential exists for visibility through the trees during leaf-off conditions. That is, it may be possible to view the Facility from within portions of the shaded areas indicating seasonal visibility, but not necessarily from all locations within those shaded areas.

11-1-1-4	Approx. Residential Properties With Potential			Approx. Residential Properties With Potential Leaf-				
Height	Year-Round Vi	ews V	Vithin 1-Mile By Str	eet	Off Vie	ws Wit	hin 1-Mile By Street*	
100-Meter Hub	Barbara Ave	6	Radio Tower Rd	5	Amber Ct	12	Horizon Vw	2
Height	Coachlight Cir	2	Robinmark Rd	2	Barbara Ave	8	Howard Ave	3
	Elaine Ct	1	Route 69	5	Candee Rd	12	Lee Rd	6
	Englewood Ave	1	Skyline Dr	1	Canfield Ct	3	Meadow Ln	11
	George St	4	Valley Ln	5	Coachlight Cir	6	Putting Green Ln	1
	Hemlock Rd	4	Woodcrest Dr	3	Cobblestone Ct	4	Radio Tower Rd	2
	Howard Ave	1			Cook Rd	37	Robinmark Ct	12
	Lee Rd	10			Deerfield Dr	23	Route 69	8
			TOTAL:	50	Elaine Ct	11	Roy Mountain Rd	7
					Fieldstone Dr	3	Sills Ave	7
					Hemlock Rd	7	Skyline Dr	15
							Stephen Ct	6
							Woodcrest Dr	42
							TOTAL:	248*
100-Meter Hub	Barbara Ave	3	Meadow Ln	4				
Height Plus 50-	Coachlight Cir	11	Route 69	8				
Meter Blade	Deerfield Dr	3	Stephen Ct	1				
Height	Elaine Ct	1	Valley Ln	6				
	Englewood Ave	3	Woodcrest Dr	7				
	Hemlock Rd	4						
	Howard Ave	3						
	Lee Rd	4						
			TOTAL:	58*				

The table below presents an inventory of residential properties within one mile of the Property that have the potential for views of the Project.

\* Denotes residential properties <u>in addition</u> to those with potential year-round views of 100-meter hub height.

Height	Approx. Residential Properties With Potential Year-Round Views Two, Three, Four and Five Miles From Proposed Project Area			
100-Meter Hub Height	1 to 2 Miles	15		
	2 to 3 Miles	9		
	3 to 4 Miles	9		
	4 to 5 Miles	0		
	TOTAL:	33		

The table below summarizes the amount of residential properties within the remainder of the Study Area that could have at least partial views of the Project.

The Project requires aviation lighting that would be mounted to the top of the turbine hubs at 100 meters. A red strobe would be activated during night hours only. It stands to reason that those areas where the turbine hub(s) can be seen would also offer views of the strobe at night.

## Attachments

# Study Area Map, Photographic Simulations, and Viewshed Maps







Figure 1 Site Location Map Wind Prospect BNE Energy, Inc. 178 New Haven Road Prospect, Connecticut













VIEW	DESCRIPTION	CITY/TOWN	ORIENTATION
1	GEORGE STREET AT ROUTE 69 (18mm focal length)	PROSPECT	NORTHWEST



0.25 MILE +/-

YEAR-ROUND



VIEW	DESCRIPTION	CITY/TOWN	ORIENTATION	DISTANCE TO SITE AREA	VISIBILITY
2	NAUGATUCK STATE FOREST VISTA AREA (50mm focal length)	NAUGATUCK	NORTHEAST	1.80 MILES +/-	YEAR-ROUND

## PHOTOGRAPHIC SIMULATION



VIEW	DESCRIPTION	CITY/TOWN	ORIENTA
3	ADJACENT TO #4 SMOKERISE CIRCLE (50mm focal length)	PROSPECT	SOUTHE