

Visual Impact Assessment

Alabama Ledge Wind Power Project

Town of Alabama

Genesee County, New York

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1.0 Introduction

Environmental Design & Research, Landscape Architecture, Planning, Environmental Services, Engineering and Surveying, P.C. (EDR) was retained to prepare a Visual Impact Assessment (VIA) for the proposed Alabama Ledge Wind Power Project (the Project) located in the Town of Alabama, New York. The purpose of this VIA is to:

- Describe the appearance of the visible components of the proposed Project.
- Define the visual character of the Project study area.
- Inventory and evaluate existing visual resources and viewer groups.
- Evaluate potential Project visibility within the study area.
- Identify key views for visual assessment.
- Assess the visual impacts associated with the proposed action.

This VIA was prepared under the direct guidance of a registered landscape architect experienced in the preparation of visual impact assessments. It is also consistent with the policies, procedures, and guidelines contained in established visual impact assessment methodologies (see Literature Cited/References section).

2.0 Project Description

2.1 Project Site

The Project site includes approximately 3,700 acres of leased private land in the Town of Alabama, Genesee County, New York (Figure 1). The site is bounded by Macomber and Slusser Roads to the east, Galloway Road to the south, Alleghany Road to the west, and Ham Road to the north. The site is located approximately 6 miles northwest of the City of Batavia, approximately 5 miles northeast of the Village of Akron, approximately 4.5 miles north-northeast of the Village of Corfu, approximately 2 miles west of the Village of Oakfield, and approximately 1.5 miles southeast of the Hamlet of Alabama (as measured to the nearest turbine).

The Project site is characterized by level to gently-rolling topography with elevation ranging from approximately 700 feet above mean sea level (amsl) in the northern most portion of the Project site to 900 feet amsl at the southern most portion of the Project site. Land use within the Project site is dominated by active agriculture, with farms and single-family rural residences generally occurring along the road frontage (see representative photos in Appendix D).

Figure 1. Site Location Map

2.2 Proposed Project

The proposed Project evaluated in this VIA is a wind-powered electric generating facility, consisting of 53 wind turbines (subsequently reduced to 52 turbines) and associated support facilities (roads, overhead/buried electrical interconnect cable meteorological towers, substation, and operations and maintenance building). Project configuration/layout is illustrated in Figure 2. The major components of the proposed Project are described below:

2.2.1 Wind Turbines

The wind turbines proposed for this Project will be in the 1.65 to 2.0 MW range, (total project size between 85.8 and 104 MW), with rotor diameter between 82 and 90 meters (m). For the purpose of the VIA, it was assumed that the Suzlon S-88 turbine is representative of what will be utilized on the Project in both size and appearance. Each wind turbine consists of three major components; the tower, the nacelle, and the rotor, all of which will be white in color. The height of the tower, or “hub height” (height from foundation to top of tower) will be approximately 328 feet (100 m). The nacelle sits atop the tower, and the rotor hub is mounted to the nacelle. Assuming an 88 m rotor diameter, the total turbine height (i.e., height at the highest blade tip position) will be approximately 475 feet (144 m). A computer model illustrating the appearance of the proposed turbine is shown in Figure 3. Descriptions of each of the turbine components are provided below.

Tower: The towers used for this Project are conical steel structures manufactured in multiple sections. The towers have a base diameter of approximately 13 feet and a top diameter of approximately 7.5 feet. Each tower will have an access door and an internal safety ladder to access the nacelle.

Nacelle: The main mechanical components of the wind turbine are housed in the nacelle. These components include the drive train, gearbox, and generator. The nacelle is approximately 30.5 feet long, 12 feet tall, and 10 feet wide. Attached to the top of approximately half of the nacelles, per specifications of the Federal Aviation Administration (FAA), will be a single aviation warning light. These will be medium intensity flashing red lights (L864) and operated only at night. For the purposes of this study, it is assumed that the nacelle will include no obvious lettering, logo, or other exterior marking.

Rotor: A rotor assembly is mounted to the nacelle to operate upwind of the tower. Each rotor consists of three composite blades, each approximately 140 feet (42.5 m) in length (total rotor diameter = 289 feet or 88 m). The rotor blades are rotated along their axis or “pitched” to enable them to operate efficiently at varying speeds. Also, the rotor can spin at varying speeds (between 15 and 17.6 revolutions per minute) to operate more efficiently at lower wind speeds.

Figure 2. Project Layout

Figure 3. Computer Model of Proposed Turbine

2.2.2 Electrical System

The proposed Project will have an electrical system that consists of 1) a system of buried (and potentially above-ground) 34.5 kilovolt (kV) cables that will collect power from each wind turbine, and 2) a substation that transfers the power from the 34.5 kV cables to the existing Niagara Mohawk-National Grid Oakfield-Lockport 115 kV transmission line and regional power grid. Each of these components is described below.

Collection System: A transformer located in the nacelle or adjacent to the base of each turbine raises the voltage of electricity produced by the turbine generator up from roughly 690 volts to the 34.5 kV voltage level of the collection system. From each turbine transformer, the electricity will flow into the collector circuit, which along with the turbine communication cables will run predominately underground (typically along proposed Project access roads). The underground collection system for turbines south of the United States Gypsum mine will gather east of Gorton Road where the electricity will transfer to a proposed 1.1 mile 34.5kV overhead line to the proposed substation located north of the gypsum mine. Electricity generated by the turbines north of the gypsum mine will be carried to the substation by an underground collection system. Within the Project site, approximately 23 miles of cable will be installed. The location of proposed collection lines is indicated in Figure 2. Because no information was available regarding above-ground portions of the collection system at the time the VIA was prepared, this component of the Project was not evaluated in this study.

Substation: The substation will be located on private land off of Gorton Road in the Town of Alabama, adjacent to the Niagara Mohawk-National Grid Oakfield-Lockport 115 kV transmission line. The station terminates the 34.5kV collection cables and steps the voltage up to 115kV. The substation will be owned by Niagara Mohawk-National Grid and is the connection to the transmission system. The substation will encompass up to 5 acres and will be enclosed by a chain link fence and accessed by a new gravel access road. The substation control building will require utility service (phone and electrical) that will be run from the nearest existing local utility lines. Because substation design/dimensions are not yet finalized, it is not addressed in this study.

2.2.3 Access Roads

The Project site includes an extensive network of existing state, county and local roads. Therefore, wherever it is practical, existing roads will be used to access the proposed Project. However, it is currently estimated that several miles of existing public roads will be improved to facilitate Project construction. Although, the location and extent of these public road improvements is currently unknown, they are not anticipated to significantly change the character of the roads, and therefore are not evaluated in this study.

In addition to using the existing public roads, the Project will require the construction of new or improved private roads to access individual turbine sites. The proposed location of Project access roads is shown

in Figure 2. The total length of access roads required to service all proposed wind turbine locations is approximately 15.5 miles, the majority of which will be upgrades to existing farm lanes. The roads will be gravel-surfaced and typically 36 to 40 feet in width including side slopes. Each road will be individually designed for site-specific engineering and environmental constraints, therefore as-built road widths may vary. Following construction, Project access roads will receive very limited use. Although included in any simulations where they may be visible, these access roads take on the appearance of farm lanes, and generally do not have a significant long-term visual impact. Consequently, the visibility and visual impact of Project access roads, on their own, are not evaluated in this study.

2.2.4 Meteorological Towers

Two or three 328-foot (100 m) tall meteorological towers will be installed to collect wind data and support performance testing of the turbines. The Project Sponsor anticipates that these towers will be galvanized steel structures, with wind monitoring instruments suspended at the end of booms attached perpendicular to the tower. Red aviation warning lights will be mounted at the top of all towers. The meteorological towers will be sited upwind of the prevailing wind direction within the larger Project area, but the final design and location of these towers have yet to be determined. In addition, meteorological towers typically have limited visibility and visual impact relative to the adjacent turbines. Consequently, this component of the Project is not addressed in this study.

2.2.5 Operations and Maintenance Facility

An operations and maintenance (O&M) building will house the command center of the Project's supervisory control and data acquisition (SCADA) system. A storage yard adjacent to the O&M building will house equipment and materials necessary to service the Project. The O&M building is anticipated to be up to 8,000 square feet in size and located to the west of Wight Road and to the north of Ledge Road. The O&M building and storage yard will utilize up to five acres of land. The Project Sponsor will incorporate motifs and design elements into the construction of the O&M building to ensure that it blends with the area's agricultural landscape. Likewise, if necessary, the Project Sponsor will provide visual screening (e.g. vegetation, berms, etc.) to reduce the visual impact of the associated storage yard. Consequently, the O&M facility should be compatible with the existing landscape, and is not evaluated as part of this study.

3.0 Existing Visual Character

Based on established visual assessment methodology (NYSDEC, not dated) the basic visual study area for the Project was defined as the area within a 5-mile radius of each of the proposed turbines, and includes 127.5 square miles in Genesee County. However, to address agency concerns regarding visibility beyond 5 miles, sensitive site mapping and viewshed analysis were extended to a 10-mile radius. This visual study area (5 and 10 mile radius) is illustrated in Figure 4.

Figure 4. Visual Study Area

3.1 Physiographic/Visual Setting

3.1.1 Landform and Vegetation

The visual study area is in the glaciated portion of the Lake Plains physiographic region of New York State (Reschke, 1990). This area is distinguished by a gently rolling outwash plain in the northern portion of the study area, sloping towards Lake Ontario. Expansive upland agricultural lands are punctuated by lower lying emergent and forested wetlands. In the southern portion of the study area the landform becomes more elevated and irregular, with a deeply cut ravine associated with Tonawanda Creek. Elevations within the study area range from approximately 700 to 900 feet above sea level.

Vegetation in the study area is a roughly 50:50 mix of open land (emergent wetland, old field and active agricultural fields) and woodlands (forested wetlands and upland deciduous forest). Open fields are primarily active cropland and pasture interspersed with and bordered by hedgerows and woodlots. Large wooded wetlands occur the northern portion of the visual study area and significant blocks of forest (upland and wetland) occur throughout the area. Most open views within the study area are enclosed, framed, or backed by trees. Forest vegetation is primarily deciduous (oak-hickory and northern hardwoods).

3.1.2 Land Use

Land use within the 5 mile-radius visual study area is dominated by undeveloped land (agricultural, successional, wetland, and wooded), farms, and rural and suburban style residences. Dairy farming is the primary agricultural activity, but fields are also used for the production of cash crops. Higher density residential and commercial development is concentrated in the Villages of Akron, Corfu, and Oakfield and several small settlements including the hamlets of Alabama, Indian Falls, and Pembroke. The villages are generally characterized by a main street business district, surrounded by traditional residential neighborhoods, with some commercial frontage development along the outskirts. Hamlets within the study area are relatively small pockets of development within a primarily rural/agricultural landscape. Outside the areas of concentrated human settlement, commercial/industrial uses within the study area occur along certain portions of state and county highways in the area. These include automobile dealerships, truck stops, retail/convenience stores, farm suppliers, and equipment yards. There is evidence of some newer suburban-type residential development in the area; primarily along the existing road frontage, but also in some subdivisions. The visual study area also includes several wildlife refuges/management areas and the Tonawanda Indian Reservation.

3.1.3 Water Features

The major water feature within a 5-mile radius of the Project site is a complex of wetlands included within the Tonawanda and Oak Orchard Wildlife Management Areas (WMA) and the Iroquois National Wildlife Refuge (NWR). The contiguous wetlands total approximately 19,000-acres (Tonawanda WMA = 5,600-acres, Oak Orchard WMA = 2,500-acres, Iroquois NWR = 11,000-acres) Water features within the boundaries of these areas including Woods Marsh, Stafford (Goose) Pond, Windmill Marsh, the Cayuga, Mohawk, Oneida, Seneca, and Onondaga Pools, Ringneck Marsh, and Center Marsh. Water features within the study area receive recreational use including bird watching, hiking, kayaking, canoeing,

camping, fishing, and hunting. In addition, Tonawanda Creek and Phelps Pond also occur within the visual study area. However, these water features are generally not major visual components of the landscape. Physical and visual access to Tonawanda Creek is limited due to its steep wooded banks and the occurrence of much of it within the densely wooded Tonawanda Indian Reservation.

3.2 Landscape Similarity Zones

Within the 5-mile radius visual study area, six distinct landscape similarity zones (LSZ) were defined. The approximate location of these zones is illustrated in Figure 5, along with representative photos of each. Their general landscape character, use, and potential views to the proposed Project are described below.

3.2.1 Zone 1: Rural Residential/ Agricultural Zone

The Rural Residential/Agricultural LSZ occurs throughout the study area, but is most abundant in the central and eastern portions. The landscape is characterized by relatively flat topography with a mix of farms and rural residences, open fields, hedgerows and woodlots. Dominant agricultural uses include dairy farming, along with grain and vegetable production. Due to the abundance of open fields, views within this LSZ are more open and long distance than those available in other zones in the study area. These views typically include a relatively flat foreground landscape, with woodland vegetation in the background. Views in the Rural Residential/Agricultural LSZ are often interrupted or framed by hedgerows and woodlots, and typically include widely scattered homes, barns, silos, and working farm equipment. Due to the abundance of open fields and the proposed location of turbines exclusively within this zone, foreground (0-0.5 mile), mid-ground (0.5-3.5 miles), and background (>3.5 miles) views of the proposed Project will be available from many areas within the Rural Residential/Agricultural LSZ.

3.2.2 Zone 2. Village/Hamlet Zone

This landscape similarity zone includes the Villages of Oakfield, Akron, and Corfu and the Hamlets of Alabama, Indian Falls, and Pembroke. This zone is characterized by moderate to high-density residential and limited commercial development. Vegetation, in the form of street and yard trees, contribute to visual character in the villages and hamlets, but within the majority of this zone, buildings (typically 1-2 stories tall) and other man-made features dominate the landscape. These features can be highly variable in their size, architectural style, and arrangement. However, buildings tend to be traditional in architectural style and arranged in an organized pattern that generally focus views along the streets and block views to distant features. In many areas, street and yard trees also help to enclose and screen views within this zone. Views of the proposed Project are generally limited from the villages due to the screening provided by buildings and adjacent woodlots. However, views are more likely from the hamlets, where housing and vegetation density is lower, and adjacent agricultural land more common.

Figure 5. Landscape Similarity Zones

3.2.3

Zone 3. Suburban Residential Zone

This zone is dominated by low to medium-density residential neighborhood development that typically occurs along agricultural road frontage or in cul-de-sacs spurring off the main roads. Buildings tend to be relatively new construction, 1-2 stories in height, and more spread out than in a village or hamlet setting. Consequently, open views to the surrounding landscape are generally more restricted than in open agricultural areas, but more available than in more concentrated of human settlement. The effect of vegetation on visibility is highly variable in this LSZ, with open fields offering open views in some areas, and hedgerows, woodlots and yard trees significantly blocking views in others. Land use in this zone is almost exclusively residential, suggesting a relatively high sensitivity to visual quality and visual change. Examples of this zone can be found on the outskirts of the City of Batavia and the Villages of Akron and Corfu.

3.2.4 Zone 4. Wetland Zone

This zone is another major LSZ within the study area. It is characterized by the dominance of wetlands, including a mix of open marshes and wooded swamps. The wetland LSZ occurs primarily in the northern portion of the study area within the Tonawanda WMA, Oak Orchard WMA, and the Iroquois NWR. Views within this zone are generally restricted to open marsh areas, overlooks, ponds, and roadside fields that provide breaks in the tree canopy. Where long distance views are available, they are typically of short duration, and/or framed by foreground tree vegetation. Land use in this zone is primarily recreational and includes bird watching, hiking, canoe/kayaking, and hunting.

3.2.5 Zone 5. Forested Zone

This zone is characterized by the dominance of forest vegetation (primarily deciduous woodlots) and relatively flat topography. The forestland zone occurs in small to medium-sized blocks throughout the visual study area, although it is concentrated in the Tonawanda Indian Reservation and the Iroquois NWR. Views within this zone are generally restricted to forest edges or areas where small clearings and road cuts provide breaks in the tree canopy. Where long distance views are occasionally available, they are typically of short duration, limited distance, and/or tightly framed by trees. Land use in this zone includes, low-density residential and recreational use (hunting, fishing, etc.). These forested areas are typically private lands with limited public access.

Major LSZ's outside the 5-mile radius visual study area are generally the same as those described above. Suburban development appears to be increasing in the area, but beyond this and other proposed wind power projects, there are no anticipated future projects or changes in land use that would alter the character of the landscape similarity zones within the visual study area.

3.3 Viewer/User Groups

Three categories of viewer/user groups were identified within the visual study area. These include the following:

3.3.1 Local Residents

Local residents include those who live and work within the visual study area. They generally view the landscape from their yards, homes, local roads and places of employment. Except when involved in local travel, residents are likely to be stationary, and have frequent or prolonged views of the landscape. Local residents may view the landscape from ground level or elevated viewpoints (typically upper floors/stories of homes). Residents' sensitivity to visual quality is variable, and may be tempered by the aesthetic character/setting of their neighborhood or work place. For example, residents with a view of existing commercial and industrial facilities may be less sensitive to landscape changes than those with a view of woodlands or open farmland. It is assumed, however, that all residents are familiar with the local landscape and may be very sensitive to changes in particular views that are important to them. Residents are concentrated in and around the villages and hamlets but occur throughout the visual study area.

3.3.2 Through Travelers/Commuters

Commuters and travelers passing through the area view the landscape from motor vehicles on their way to work or other destinations. Commuters and through travelers are typically moving, have a relatively narrow field of view, and are destination oriented. Drivers on major roads in the area (e.g., Interstate Route 90, and State Routes 5, 33, and 77) will generally be focused on the road and traffic conditions, but do have the opportunity to observe roadside scenery. Passengers in moving vehicles will have greater opportunities for prolonged off-road views than will drivers, and accordingly, may have greater perception of changes in the visual environment.

3.3.3 Tourists/Recreational Users

Tourists and recreational users include a wide range of individuals, from visitors to the Darien Lake Amusement Park, to bird watchers and hunters visiting the area's wildlife refuges/management areas. This group also includes campers, snowmobilers, fishermen, and local residents involved in various outdoor recreational activities (e.g., boating, swimming, or walking). These viewers may observe the landscape on their way to a destination or from the destination itself. Tourists' and recreational users' sensitivity to visual quality and landscape character will be variable (depending on the activity in which they are involved), although this group is generally considered to have relatively high sensitivity to aesthetic quality and landscape character. Recreational users will often have continuous views of landscape features over relatively long periods of time. Passive recreational activities generally do not require as much concentration as more active recreational activities, and tend to be more focused on the enjoyment of scenery. Those engaged in passive activities, therefore have the opportunity to observe the surrounding area for a prolonged period of time and may be particularly sensitive to visual change. Tourists and recreational users will be concentrated in the northern portions of the study area in the wildlife areas, and outside the 5 mile-study area radius, in and around the Erie Canal settlements to the north, and the Darien Lake Amusement Park to the south. However, these viewers will also traverse the area while traveling the major roads. Most of these viewers will only view the surrounding landscape from ground-level, although elevated views are available from some observation platforms in the wildlife areas.

3.4 Visually Sensitive Resources

The 5-mile radius visual study area includes multiple sites that the New York State Department of Environmental Conservation (NYSDEC) Visual Policy (DEP-00-2) considers scenic resources of statewide significance (NYSDEC, 2000 – See Appendix A). These include one site listed on the National Register of Historic Places (Mount Pleasant, Corfu), three State Wildlife Management Areas, one National Wildlife Refuge, one National Natural Landmark, one State Unique Area, several NYSDEC trails and observation towers in the wildlife areas, and a section of the Finger Lakes Trail that occurs in the southwestern portion of the study area (see Table of Sensitive Sites in Appendix C for details). Within the visual study area, there are no State Parks, Urban Cultural Parks, State Forest Preserve lands, National Park Service lands, designated scenic overlooks, designated Scenic Byways, designated Wild, Scenic or Recreational Rivers, or designated Scenic Areas of Statewide Significance (NYSOPRHP Web Site; NYSDOT, not dated; ECL Article 15 Title 27; NYSDOS, 1993). Review of existing data also failed to reveal the presence of any State Nature or Historic Preserve Areas or Bond Act Properties purchased under the Exceptional Scenic Beauty or Open Space category. Beyond these scenic resources of statewide significance, the 5-mile radius visual study area also includes areas that are regionally or locally significant/sensitive, due to the type or intensity of land use they receive. These include the Villages of Akron, Corfu, and Oakfield, the Hamlets of Alabama, Indian Falls, and Pembroke, the Tonawanda Indian Reservation, multiple snowmobile trails, and several publicly-accessible waterbodies.

The area between 5 and 10 miles from the Project site includes an additional 16 scenic resources of statewide significance. These include an additional 14 historic structures/districts listed on the National Register of Historic Places (in the City of Batavia and the Villages of Akron, Alexander, and Medina), Darien Lake State Park, and the Erie Canal Heritage Area. These resources, along with scenic resources of regional or local significance and areas of intensive land use within 10 miles of the proposed Project, are listed in the Sensitive Sites Table included in Appendix C, along with information on their location and distance to the nearest proposed wind turbine.

The location of visually sensitive resources within the visual study area is illustrated in Figure 6, and on the large-scale viewshed maps included as Appendix C.

Figure 6. Visually Sensitive Resources

Figure 6. Visually Sensitive Resources

4.0 Visual Impact Assessment Methodology

The Visual Impact Assessment (VIA) procedures used for this study are consistent with methodologies developed by the U.S. Department of the Interior, Bureau of Land Management (1980), U.S. Department of Agriculture, National Forest Service (1974), the U.S. Department of Transportation, Federal Highway Administration (1981), U.S. Army Corps of Engineers (Smardon, et al., 1988) and the NYS Department of Environmental Conservation (not dated). The specific techniques used to assess potential Project visibility and visual impacts are described in the following section.

4.1 Project Visibility

An analysis of Project visibility was undertaken to identify those locations within the visual study area where there is potential for the proposed wind turbines to be seen from ground-level vantage points. This analysis included identifying potentially visible areas on viewshed maps, preparing technical cross sections, and verifying visibility in the field. The methodology employed for each of these assessment techniques is described below.

4.1.1 Viewshed Analysis

Topographic viewshed maps for the Project were prepared using USGS digital elevation model (DEM) data (7.5-minute series), the location and height of all proposed turbines (see Figure 2), and ESRI ArcView® software with the Spatial Analyst extension. Two 10-mile radius topographic viewsheds were mapped, one to illustrate “worst case” daytime visibility (based on a maximum blade tip height of 476 feet above existing grade) and the other to illustrate potential visibility of turbine lights (based on a nacelle height of 328.1 feet above existing grade).

The ArcView program defines the viewshed (using topography only) by reading every cell of the DEM data and assigning a value based upon visibility from observation points throughout the 10-mile study area. The resulting topographic viewshed maps define the maximum area from which any turbine within the completed Project could potentially be seen within the study area during both daytime and nighttime hours (ignoring the screening effects of existing vegetation and structures). Because the screening provided by vegetation and structures is not considered in this analysis, the topographic viewsheds represent a “worst case” assessment of potential Project visibility.

A turbine count analysis was performed to determine how many wind turbines are potentially visible from various locations within the viewshed. This analysis was based on blade tip height and utilizes the same topographic viewshed methodology described above. The results of this analysis are then grouped by number of turbines potentially visible. Three turbine count groups were defined to create an even distribution of turbines within each group, and to allow easy interpretation of the final map.

In addition, a vegetation viewshed analysis was also prepared to better illustrate the potential screening effect of forest vegetation. The vegetation viewshed utilized a base vegetation layer created with USGS National Land Cover Data (forests) with an assumed elevation of 40 feet. This layer was added to the digital elevation model to produce a base layer for the viewshed analysis, as described above (using the blade tip height as input data). Once the viewshed analysis was completed, the areas covered by the

forest vegetation layer were designated as “not visible” on the resulting data layer to reflect the fact that views from within forested areas will be screened.

It is worth noting that because characteristics of the proposed turbines that influence visibility (color, narrow profile, distance from viewer, etc.) are not taken consideration in the viewshed analyses, being within the viewshed does not necessarily equate to actual Project visibility.

4.1.2 Cross Section Analysis

To further illustrate the screening effect of vegetation and structures within the study area, four representative line-of-sight cross sections (ranging from 14.8 to 20 miles long) were cut through the study area. Cross section locations were chosen so as to include visually sensitive areas (e.g., villages, wildlife areas, and major roads) and cover the various landscape similarity zones occurring within the 5-mile radius study area. The cross sections are based on forest vegetation and topography as indicated on the 7.5-minute USGS quadrangle maps and digital aerial photographs. For the purposes of this analysis, a uniform 40-foot tree height was assumed. A 10 fold vertical exaggeration was used to increase the accuracy of the analysis and facilitate reader interpretation.

4.1.3 Field Verification

Actual visibility of the proposed Project was evaluated in the field on December 21, 2006. Four 15-foot by 6-foot helium-filled balloons were tethered at the approximate location of proposed Turbines 5, 23, 29, and 46 and raised to a height of approximately 500 feet above the existing grade, thus somewhat higher than the maximum finished elevation of the turbine blade tip when oriented straight up (i.e., at the 12 o'clock position). The purpose of this exercise was to provide a locational and scale reference to verify visibility of the proposed turbines and to obtain photographs for subsequent use in the development of visual simulations. A mix of clear skies and high clouds resulted in generally good visibility and a representative variety of sky conditions. Calm winds resulted in relatively stationary balloon heights throughout the day.

While the balloons were in the sky, field crews drove public roads and visited public vantage points within the 5-mile radius study area to document points from which the balloons could or could not be seen. Photos were taken from 241 representative viewpoints within the study area. All photos were obtained using Nikon (D50 and D70) or Canon (20D) digital SLR cameras. All cameras utilized a focal length between 28 and 35 mm (equivalent to between 45 and 55 mm on a standard 35 mm film camera). This focal length most closely approximates normal human eyesight relative to scale. Viewpoint locations were determined using hand-held global positioning system (GPS) units and high resolution aerial photographs (digital ortho quarter quadrangles). The time and location of each photo were documented on all electronic equipment (cameras, GPS units, etc.) and noted on field maps and data sheets (see Appendix D). Viewpoints photographed during field review generally represented the most open, unobstructed available views of the balloons.

4.2 Project Visual Impact

Beyond evaluating potential Project visibility, the VIA also examined the visual impact of the proposed wind turbines on the aesthetic resources and viewers within the Project study area. This assessment involved creating computer models of the proposed Project turbines and layout, selecting representative viewpoints within the study area, and preparing computer-assisted visual simulations of the proposed Project. These simulations were then evaluated by a panel of three registered landscape architects (one in-house and two independent) to determine the type and extent of visual impact resulting from Project construction. Details of the visual impact assessment procedures are described below.

4.2.1 Viewpoint Selection

From the photo documentation conducted during field verification, EDR selected a total of 19 viewpoints for development of visual simulations. These viewpoints were selected based upon the following criteria:

1. They provide clear, unobstructed views of the Project (as indicated by balloon visibility).
2. They illustrate Project visibility from sensitive sites/resources with the visual study area.
3. They illustrate typical views from landscape similarity zones where views of the Project will be available.
4. They illustrate typical views of the proposed Project that will be available to representative viewer/user groups within the visual study area.
5. They illustrate typical views of different numbers of turbines, from a variety of viewer distances, and under different lighting conditions, to illustrate the range of visual change that will occur with the Project in place.

Location of the selected viewpoints is indicated in Figure 9. Locational details and the criteria for selection of each simulation viewpoint are summarized in Table 1, below:

Table 1. Viewpoints Selected for Simulations and Evaluation

Viewpoint Number	Visually Sensitive Resource	LSZ Represented	Viewer Group Represented	Viewing Distance ¹	View Orientation ²
3	-	Rural/Agricultural	Residents/Travelers	M	NW
13	-	Rural/Agricultural	Residents	F	N
21	-	Rural/Agricultural	Residents/Travelers	M	NE
34	-	Suburban	Residents	M	N-NE
40	Indian Falls Lake	Suburban	Residents/Recreation	M	NE
58	NYS Thruway	Rural/Agricultural	Travelers	M	N-NE
71	Route 5	Rural/Agricultural	Residents/Travelers	M	N-NW
93	Finger Lakes Trail	Suburban/ Agricultural	Residents	B	NE
126	Oakfield Area	Rural/Agricultural	Residents/Travelers	M	W-SW
158	-	Suburban	Residents	M	N-NE
159	-	Rural/Agricultural	Residents/Travelers	F	NW
165	-	Rural/Agricultural	Residents	M	SW
170	Cemetery	Rural/Agricultural	Residents/Travelers	M	SE

Viewpoint Number	Visually Sensitive Resource	LSZ Represented	Viewer Group Represented	Viewing Distance ¹	View Orientation ²
176	Tonawanda Indian Reservation	Rural/Hamlet	Residents/Travelers	M	SE
182	-	Rural/Agricultural	Residents/Travelers	F	S-SE
205	Oak Orchard WMA	Wetland	Recreational	B	S-SW
224	Iroquois NWR	Wetland	Recreational	B	SE
230A	Cemetery	Rural/Agricultural	Residents/Travelers	M	SE
239	-	Rural/Agricultural	Residents	F	S-SW

¹ F = Foreground (0-0.5 miles), M = Mid-ground (0.5-3.5 miles), B = Background (>3.5 miles)

² N = North, S = South, E = East, W = West

4.2.2 Visual Simulations

To show anticipated visual changes associated with the proposed Project, high-resolution computer-enhanced image processing was used to create realistic photographic simulations of the completed turbines from each of the 19 selected viewpoints. The photographic simulations were developed by constructing a three-dimensional computer model of the proposed turbine and turbine layout based on turbine specifications and survey coordinates provided by the Project developer. For the purposes of this analysis, it was assumed that all new turbines would be Suzlon S-88 machines. Simulation methodology and accuracy is outlined in Appendix B, and the computer model used in this VIA is shown in Figure 2.

The next step in this process involved utilizing aerial photographs and GPS data collected in the field to create an AutoCAD 2004® drawing. The two dimensional AutoCAD data was then imported into AutoDesk 3ds MAX 9.0® and three-dimensional components (cameras, modeled turbines, etc.) were added. These data were superimposed over photographs from each of the viewpoints, and minor camera changes (height, roll, precise lens setting) made to align all known reference points within the view. This process ensures that Project elements are shown in proportion, perspective, and proper relation to the existing landscape elements in the view. Consequently, the alignment, elevations, dimensions and locations of the proposed structures will be accurate and true in their relationship to other landscape features in the photo (see Appendix B).

At this point, a “wire frame” model of the facility and known reference points is shown on each of the photographs. The proposed exterior color/finish of the turbines is then added to the model and the appropriate sun angle is simulated based on the specific date, time and location (latitude and longitude) at which each photo was taken. This information allows the computer to accurately illustrate highlights, shading and shadows for each individual turbine shown in the view. All simulations show the turbines with rotors oriented toward the northeast, which is generally the prevailing wind direction in the area. To replicate sky/visibility conditions in some of the photos, hazing was added to the simulations from Viewpoints 230 and 239. To illustrate the full expanse of the Project that may be perceived from certain viewpoints, a panoramic simulation was created at Viewpoint 13. This image was created by stitching together four 50 mm photos to illustrate an approximately 90-degree field of view. To illustrate the motion of the turning rotor, animation was added to the simulations from Viewpoint 126 and 239 (see digital images in Appendix E).

4.2.3 Panel Evaluation

A panel of three landscape architects (one in-house and two independent) was asked to rate the proposed Project in terms of its contrast with existing components of the landscape. The methodology utilized in this evaluation is a simplified version of the U.S. Army Corps of Engineers Visual Resources Assessment Procedure (VRAP) (Smardon, et al., 1988). It was developed by EDR in 1999 for use on wind power projects, and has subsequently been modified based on agency comments and internal review. The procedure involves using a rating panel, a short evaluation form, and a simple numerical rating scale. Along with having proven to be accurate in predicting public reaction to wind power projects, EDR believes this approach offers the following benefits:

- It prevents individual preference/bias (either for or against the Project) from significantly skewing results.
- It provides understanding of the basis for conclusions regarding visual impact.
- It allows for independent review and replication of the evaluation procedure.
- It allows a large number of viewpoints to be evaluated in a reasonable amount of time without “burn-out” of the panel members.

Using this methodology, digital color prints (11 x 17-inch) of the before and after photos from each selected viewpoint were evaluated by the panel. Along with general observations, the Project's contrast with existing vegetation, landform, land use, water resources, and user activity was rated on a scale of 1 (completely compatible) to 5 (incompatible). For each viewpoint, these scores were added and averaged to provide an overall contrast rating. Each panel member's overall score for each viewpoint was then added and averaged to get a final composite rating for each viewpoint. In addition, rating panel member comments on each viewpoint, and on nighttime photos from the Fenner (New York) Wind Power Project were used to evaluate the Project's overall visual impact.

5.0 Visual Impact Assessment Results

5.1 Project Visibility

Potential turbine visibility, as indicated by the viewshed analyses, is illustrated in Figure 7 and summarized in Table 2. As indicated by the topographic blade tip analysis, the proposed Project would be visible in approximately 98% of the 5-mile study area and 91% of the 10-mile study area. Areas screened by topography alone are limited to the back sides of some ridges and valley areas in the southeastern and northern portions of the study area. These areas are concentrated between 5 and 10 miles from the Project. Areas within 5 miles that are fully screened by topography include the Tonawanda Creek valley and the backsides of a few hills to the south and east. All of the visually sensitive sites of statewide significance within the 5-mile radius study area are indicated as at least partially visible in the topographic viewshed analysis (see large scale viewshed maps in Appendix C). Only some portions of the Villages of Akron, Alexander, Corfu, Elba and Medina, and certain sections of State Routes 98 and 31 are indicated as being completely screened from views of the Project based on topography alone.

As indicated by the turbine count analysis (Figure 7, Sheet 2) in most areas where potential visibility is indicated by the topographic viewshed analysis, views to the majority (41-56) of the proposed turbines could be available. Only about 10% of the 5-mile radius study area, and 20% of the 10-mile radius study area will have potential views that include fewer than 40 turbines (if screening by trees is not considered).

Areas of potential nighttime visibility (Figure 7, Sheet 3) cover approximately 97% of the 5-mile radius study area and 88% of the 10-mile radius study area, and are indicated in roughly the same locations indicated by the blade tip analysis.

Factoring vegetation into the analysis significantly decreases potential Project visibility (Figure 7, Sheet 4). As indicated in Table 3, the vegetation viewshed covers only 49% of the 5-mile radius study area, and 35% of the 10-mile radius study area. These areas are concentrated in areas with an abundance of open agricultural fields, primarily within 2-3 miles of the turbines. The vegetation viewshed excludes all or significant portions of several sensitive sites, including most of the villages (except Oakfield) and historic sites, as well as the vast majority of Darien Lake State Park, the Tonawanda and Oak Orchard WMAs, the Iroquois NWR, and the Tonawanda Indian Reservation. The majority of the NYS Thruway and the City of Batavia are also indicated as being screened from view of the Project by topography and vegetation.

As mentioned previously, areas of actual visibility are anticipated to be much more limited than indicated by the viewshed analysis, due to the slender profile of the turbines (especially the blade, which make up the top 140 feet of the turbine), the effects of distance, and screening from hedgerows, street trees and structures, which are not considered in the viewshed analysis.

Table 2. Viewshed Results Summary

Type of Viewshed	5-mile Viewshed Ring			10-mile Viewshed Ring			5-10-mile Viewshed Ring		
	Total Acres	Visible Acres	%	Total Acres	Visible Acres	%	Total Acres	Visible Acres	%
Blade Tip Topo Only	91,297	89,717	98%	277,776	253,621	91%	186,477	163,872	88%
0 Visible	91,297	1,599	2%	277,776	24,272	9%	186,477	22,663	12%
1-20 Visible	91,297	2,828	3%	277,776	13,625	5%	186,477	10,795	6%
21-40 Visible	91,297	4,631	5%	277,776	15,183	5%	186,477	10,548	6%
41-56 Visible	91,297	82,239	90%	277,776	224,696	81%	186,477	142,430	76%
Nacelle/ Lighting Topo Only	91,297	88,589	97%	277,776	244,104	88%	186,477	155,486	83%
Blade Tip Topo & Vegetation	91,297	44,330	49%	277,776	98,015	35%	186,477	53,677	29%

Figure 7. Viewshed Analyses

Figure 7. Viewshed Analyses-2

Figure 7. Viewshed Analyses-3

Figure 7. Viewshed Analyses-4

Cross section analysis (Figure 8) indicates that the Project will be visible from between 37.8% and 47.9% of the area along the selected lines of sight. Although this conclusion only applies to the specific lines of sight evaluated, analysis suggests that views of the Project from most of the visually sensitive sites within the study area are likely to be at least partially screened by buildings and trees. The cross sections indicate that views of turbines along the selected site lines will not be available from the City of Batavia, the Village of Akron, the Iroquois NWR, the Tonawanda WMA, the Tonawanda Indian Reservation, the Village of Corfu, Darien Lake State Park, and the John White Memorial Game Farm. Tonawanda Creek, the Genesee County Fairground, and woodlots throughout the study area are also indicated as being screened. It should be noted that views of other turbines, not located along the selected cross sections may be available from some of the sensitive receptors listed above. The results of the cross section analysis are summarized in Table 3. Additional detail is provided in the sensitive site table included in Appendix C.

Table 3. Line-of-Sight (LOS) Summary

Line-of-Sight A-A'		47.9% Potential Project Visibility along 19.5-mile LOS	
Visually Sensitive Resources in LOS	Location	Potential Visibility*	
Finger Lakes Trail	Town of Newstead	NV	
Village of Akron		NV	
Tonawanda Creek	Town of Pembroke	NV	
Village of Oakfield		PV	
Village of Elba		PV	
Line-of-Sight B-B'		37.8% Potential Project Visibility along 17.8-mile LOS	
Visually Sensitive Resources in LOS	Location	Potential Visibility	
Village of Medina		PV	
Iroquois NWR	Town of Alabama	NV	
Oak Orchard Creek	Town of Shelby	NV	
Reed Cemetery	Town of Alabama	NV	
Tonawanda Creek	Town of Pembroke	NV	
NYS Thruway	Town of Pembroke	V	
Hamlet of North Pembroke		V	
Hillside Cemetery	Town of Pembroke	NV	
Line-of-Sight C-C'		38.6% Potential Project Visibility along 20-mile LOS	
Visually Sensitive Resources in LOS	Location	Potential Visibility	
Tonawanda WMA	Town of Alabama	NV	
Tonawanda Indian Reservation		NV	
Tonawanda Creek	Tonawanda Indian Reservation	NV	
NYS Thruway	Town of Batavia	PV	
City of Batavia		NV	

Gensee Co. Fairground	Town of Batavia	NV
Line-of-Sight D-D'	46% Potential Project Visibility along 14.8-mile LOS	
Visually Sensitive Resources in LOS	Location	Potential Visibility
Darien Lakes State Park	Town of Darien	NV
Village of Corfu		NV
Murder Creek	Town of Pembroke	NV
NYS Thruway	Town of Pembroke	NV
John White Memorial Game Farm	Town of Alabama	NV
Iroquois NWR	Town of Alabama	PV

*V – Visible, PV – Partially Visible, NV – Not Visible. Only refers to visibility of turbines located along the selected cross sections.

Figure 8. Line-of-Sight Cross Sections

Figure 8. Line-of-Sight Cross Sections – 2

Figure 8. Line-of-Sight Cross Sections – 3

Figure 8. Line-of-Sight Cross Sections – 4

Figure 8. Line-of-Sight Cross Sections – 5

Field review also confirmed that actual Project visibility, (as indicated by visibility of the helium-filled balloons raised at four proposed turbine sites) is likely to be more limited than suggested by viewshed mapping. This is due to the fact that screening provided by buildings and trees within the study area is more extensive and effective than assumed in these analyses (e.g., vegetation is more extensive than indicated on the USGS maps, and often taller than 40 feet in height). The result is that certain sites/areas where "potential" visibility was indicated by viewshed mapping were actually well screened from views of the proposed Project. Field review confirmed a lack of visibility from areas that were heavily forested, and areas in low valleys. In the rural/agricultural portions of the study area, hedgerows and trees not indicated on the USGS maps also blocked/interrupted views of the balloons in many areas. The balloons could generally not be seen from the Tonawanda Indian Reservation or the various villages, including the Village of Oakfield (where potential visibility was indicated by viewshed mapping and cross section analysis). The balloons could also not be seen from any sites within the City of Batavia. In these areas, ground-level views were typically blocked by buildings and trees. However, the balloons could be seen from outskirts of the Village of Oakfield as well as from certain open areas within the Iroquois NWR, the Oak Orchard WMA, and the Tonawanda Indian Reservation. Balloon visibility was also documented from sections of the Finger Lakes Trail, the NYS Thruway, State Route 5 and several cemeteries

A comprehensive summary of potential Project visibility from sensitive sites is presented in the table included in Appendix C.

5.2 Analysis of Existing and Proposed Views

To illustrate anticipated visual changes associated with the proposed Project, photographic simulations of the completed Project from each of the 19 viewpoints indicated in Figure 9 were used to evaluate Project visibility and appearance. Rating panel review of these images, along with photos of the existing view, allowed for comparison of the aesthetic character of each view with and without the proposed Project in place. Results of this evaluation are presented below.

Figure 9. Viewpoint Location Map

Viewpoint 3 (Figure 10)*Existing View*

Viewpoint 3 is from County Highway 26, in the Town of Alabama, approximately 0.8 mile from the nearest turbine that would be visible in this view. It is typical of views available to local residents and travelers in the rural residential/agricultural LSZ. The existing view includes a harvested cornfield in the foreground, backed by a continuous line of forest vegetation (hedgerow and woodlot) in the mid-ground. A two-lane asphalt road and roadside utility poles angle from the foreground to the mid-ground on the left hand side of the view. Topography is relatively level, and the tree line, field edges, and overhead utility lines all create strong horizontal lines in this view. Distant background views are blocked by the mid-ground tree line. The view is fairly expansive, and of average aesthetic quality.

Proposed Project

With the proposed Project in place, numerous turbines rise above the mid-ground tree line. The trees screen the base of the nearest turbines, and all but the blade tips of the more the distant machines. The turbines present strong contrast with the existing landscape, in terms of their form, line, and scale. However at this distance their perceived height and vertical line are fairly consistent with the roadside utility poles, and their color blends fairly well with the overcast sky. The number of turbines visible and their density (especially on the left hand side of the view) does present some level of visual clutter, but this impact is limited by their background location and some existing visual clutter in the foreground. The rating panel felt the turbines had a moderate degree of aesthetic impact, but were compatible with the agricultural land use and added an element of visual interest to the view.

Figure 10. Viewpoint 3

Viewpoint 13 (Figure 11)*Existing View*

This viewpoint is from Galloway Road in the Town of Pembroke. It is approximately 0.4 mile from the nearest turbine that would be visible in this view, and is typical of views that are available to local residents in the rural residential/agricultural LSZ. A panoramic image (i.e., approximately 90 degree field of view) has been presented to convey the sense of openness and the availability of views in multiple directions from this viewpoint. The existing view is dominated by large, open agricultural fields (harvested corn) in the foreground and mid-ground. A paved road and roadside utility poles angle through the fields in the mid-ground. A rural home (on the left hand side of the view) and a centrally located farm complex occur along the road frontage, and are focal points in the existing view. Landform is level to gently rolling, and woodlots in the background form a gently undulating horizon line. The woods line, road, field edges, and structures in this view all create strong horizontal lines in the landscape.

Proposed Project

With the proposed Project in place, numerous turbines are visible across the full field of view. These turbines occur at various distances, both within and beyond the open fields in the foreground and mid-ground. The turbines' line, form, and scale are in strong contrast with the existing features of the landscape. Their scale contrast is heighten by their proximity to the existing trees and man-made structures in the view. The turbines appear somewhat compatible with the working agricultural landscape, but their size and quantity overwhelms the existing features of the landscape. They appear incompatible with the rural residential land use and add an industrial element to the landscape. The turbines now dominate the view and become the visual focal points. Overall, the rating panel considered the Project to have a moderate to high adverse impact on this view, and gave this simulation the highest overall contrast rating.

Figure 11. Viewpoint 13

Viewpoint 21 (Figure 12)*Existing View*

This view is from Ledge Road in the Town of Albama. It is typical of views that will be available to local residents and travelers in the rural residential/agricultural LSZ, and is approximately 0.9 mile from the nearest turbine that would be visible in this view. This roadside view features an open hay field and sparse hedgerow in the foreground, with additional open fields, hedgerows, and woodlots visible in the mid-ground and background. Distant woodlots form an undulating horizon line in the background. Scattered homes and barns are also visible in the mid-ground and background beyond (and through) the foreground hedgerow. Landform is relatively level, although elevation appears to increase slightly with distance. This combination allows more distant background views, but tends to compress the mid-ground and background into a narrow, horizontal band beyond the foreground hedgerow. The open fields and lack of large trees create a sense of openness and an expansive view of the sky from this viewpoint.

Proposed Project

With the proposed Project in place, a widely-spaced cluster of 10 turbines appears beyond the foreground hedgerow. The turbines' line, form, and scale are in moderate to strong contrast with the existing landscape features. Perceived scale contrast is heighten by the turbines' proximity to built structures, and the height to which they rise above the background trees. Their white color blends well with the partly cloudy sky, although strong shadows on the back of the blades and towers heightens contrast with the sky. Although the turbines punctuate the skyline, they complement the undulation of the vegetation mass, and at this distance they appear in balance with the land and sky. However, the turbines become strong focal points and now dominate the view. Although the turbines may be distracting to some viewers, one rating panel member felt they would add an element of interest to a relatively ordinary rural landscape. None of the panel members felt the Project would have an overall adverse effect on aesthetic quality in this view.

Figure 12. Viewpoint 21

Viewpoint 34 (Figure 13)*Existing View*

This view is from County Highway 4 in the Town of Pembroke. It is typical of the views that are available to some local residents from the suburban and rural residential/agricultural LSZs. This viewpoint is approximately 1.6 miles from the nearest turbine that would be visible in this view. The view is from a residential yard adjacent to an open cornfield. A house, lawn, and yard trees, as well as an adjacent cornfield, define the foreground of this view, while a line of homes and a solid band of trees back the field in the mid-ground. The band of trees appears to extend toward the background and blocks distant views. The view is enclosed and framed by the branches of trees in the yard. Very little would be visible from this viewpoint during the growing season when the trees are leafed out.

Proposed Project

With the proposed Project in place, several turbines can be seen rising above the band of trees in the background. The trees screen only the bases of some turbines, while others are almost completely screened. The turbines are also lost somewhat in the bare branches of the yard trees, and blend well with the sky under these lighting/sky conditions. However, the turbines' scale and form are in contrast with the existing landscape features, and they appear somewhat out of place rising above the suburban houses and trees. The rating panel generally felt that the Project had an adverse effect on aesthetic quality, but that the degree of impact was low, due primary to the Project's distance from the viewer, and the screening provided by vegetation and topography.

Figure 13. Viewpoint 34

Viewpoint 40 (Figure 14)*Existing View*

This view is from the Indian Falls Lake residential subdivision in the Town of Pembroke, approximately 2.1 miles from the nearest turbine that would be visible in this view. This view is representative of the most open views of the Project that will be available to residents (including those involved in water based recreation) in this suburban setting. The existing view features Indian Falls Lake and an associated bathing beach in the foreground, with relatively new homes and yards fronting the lake on the opposite shoreline. The new homes have compromised the natural aesthetic quality of the lake, and are the dominant features in the view. Mid-ground trees beyond these homes block more distant background views.

Proposed Project

With the proposed Project in place, several turbines can be seen through and above the mid-ground trees, especially on the right hand side of the view. The line and color of the turbines is consistent with the mid-ground tree line. At this distance, the turbines are not overwhelming in scale, but do appear very large relative to the existing trees and one of the shoreline homes. In addition, their form and land use connotation appear inconsistent with the tranquil residential/recreational character of this site. However, this inconsistency/contrast is minimized by the effects of distance and the screening provided by the existing trees. In addition, the presence of the new homes has already compromised the natural visual quality of the lake setting.

Figure 14. Viewpoint 40

Viewpoint 58 (Figure 15)*Existing View*

This viewpoint is from the east-bound lane of the NYS Thruway (Interstate Route 90) near Cleveland Road. It is representative of open views available to commuters and through-travelers, and is approximately 2.0 miles from the nearest turbine that would be visible in this view. Unlike views immediately to the west, which are screened by roadside trees, agricultural fields and successional shrubland along the Thruway in this area allow for open views toward the Project site to the north. This view features the paved lanes and grassy median of the Thruway in the foreground, with a mix of fields, hedgerows, successional vegetation, and forest in the mid-ground. This mid-ground area also includes several farm structures and residences interspersed amongst the vegetation. Topography is level, and the background/horizon line is defined by a fairly continuous band of forest vegetation. The road edges, field edges, and background tree line form strong horizontal lines in the landscape.

Proposed Project

With the proposed Project in place, numerous turbines stretch across the full field of view. The turbines rise well above the tree line in the background, accentuating their scale contrast with the existing vegetation and topography. However, their impact is mitigated by the effects of distance and their compatibility with a working agricultural landscape. Their white color also blends fairly well with the sky, and their vertical line is consistent with the trees, silos, and other vertical elements of the landscape. However, their overall contrast in scale, line, and form is moderate to high, and the abundance of turbines changes the character of this view. The rating panel indicated that the turbines had a neutral or positive impact on aesthetic quality from this location, and could become a point of interest (or a minor distraction) to drivers and passengers traveling on the Thruway in this area.

Figure 15. Viewpoint 58

Viewpoint 71 (Figure 16)*Existing View*

This view is from State Highway 5 in the Town of Pembroke. It is a relatively high quality view that is available to residents and travelers along State Route 5 in the southern portion of the visual study area. This viewpoint is in the rural residential/agricultural LSZ, and is approximately 2.8 miles from the nearest turbine that would be visible in this view. The existing view features a roadside rural residential yard that includes trees, an out-building, and pastures enclosed by an attractive stone wall. Land form is sloping, and open agricultural fields and hedgerow vegetation can be seen in the mid-ground with a solid line of trees defining the background/horizon line. Strong horizontal lines are created by the stone wall, road edge, and overhead utility lines that span the sky.

Proposed Project

With the proposed Project in place, portions of several turbines can be seen rising above the background tree line. Under these sky conditions, and at this distance, the turbines present minimal color contrast with the sky or vegetation. Their height above the trees indicates their large size, but their vertical line and form is consistent with the tree trunks and branches included in this view. At this distance, the turbines are subordinate visual elements, and do not create significant contrast with the strong horizontal lines and foreground elements that dominate the landscape. The turbines do not diminish the aesthetic quality of the view, and should not have a significant impact on affected viewers in this location.

Figure 16. Viewpoint 71

Viewpoint 93 (Figure 17)*Existing View*

This view is from Lovers Lane Road in the Town of Pembroke. It is typical of what residents see from the suburban residential and rural residential/agricultural LSZs and is approximately 3.8 miles from the nearest turbine that would be visible in this view. It is also the most open view from the Finger Lakes Trail, which runs along Lovers Lane Road and State Route 5 in this area. The existing view features a cornfield and newly built home in the foreground, with hedgerow and woodlot trees forming a horizontal band across the mid-ground. Except for glimpses of more distant woodlots and open fields, this vegetation blocks views to the background. The level to gently rolling topography, in combination with a lack of foreground vegetation, provides unobscured views of open sky.

Proposed Project

With the proposed Project in place, several background turbines can be seen among the trees in the mid-ground hedgerow. At this distance, line, form, and scale contrast is minimized, as the turbines blend with the hedgerow vegetation. The overcast sky and lack of strong shadows minimizes color contrast with the vegetation and the sky. Although the turbines indicate a change in nearby land use, their visual impact from this viewpoint is minimal. Due to their distance and the presence of other nearby (and more dominant) man-made objects in the view, the turbines should have little adverse affect on recreational users of the Finger Lakes Trail.

Figure 17. Viewpoint 93

Viewpoint 126 (Figure 18)*Existing View*

This view is from Maple Avenue near the Cary cemetery, just outside the Village of Oakfield. It is the first available open view toward the Project site, as one leaves the village, and is typical of views drivers and local residents have from the rural residential/agricultural LSZ. The existing view is approximately 2.0 miles from the nearest proposed turbine, and features a fenced cemetery and expanse of paved roadway in the foreground. The cemetery is backed by an open agricultural field and wooded hedgerow in the mid-ground. This hedgerow partially screens background views, but a large building complex (United States Gypsum Company) and a wooded background ridge are clearly visible beyond it. The road corridor also offers an open view to the background. Landform is gently rolling, and lack of foreground structures or trees provide broad views of the open sky.

Proposed Project

With the proposed Project in place, numerous turbines rise well above the mid-ground hedgerow, and can be seen in the mid-ground and background across the entire field of view. Lighting/shadowing conditions create moderate to strong color contrast with the sky. The turbines' height above the land and trees also accentuates their strong scale contrast. The number of turbines present, and their unique form, indicate a clear change in land use and creates visual clutter along the horizon line. Although the turbines vertical line is consistent with utility poles and other existing man-made elements in the view, their number and size cause them to now dominate the view, reducing natural features to a visually subordinate status. The rating panel felt that the Project would have an overall negative impact on aesthetics and viewer activity in this location.

Figure 18. Viewpoint 126

Viewpoint 158 (Figure 19)*Existing View*

This view is from Wight Road in the Town of Alabama. It is located approximately 0.6 mile from the nearest turbine that would be visible in this view, and is typical of the suburban residential LSZ. The existing view features two residential yards/homes along the road frontage. Mature trees, lawn and the ranch-style structures in the foreground dominate the view. The homes are backed by an open field, but yard trees and the homes themselves largely screen views beyond the foreground. A mid-ground hedgerow and dropping elevation do not allow for views of background landscape features from this location.

Proposed Project

With the proposed Project in place, portions of two turbines can be seen through the tree branches in the yards. Although the turbines are relatively close, and appear large, their visibility and contrast (in line, form, and scale) are significantly reduced due the screening provided by foreground vegetation. While more open views are likely available elsewhere within these yards and from the homes, the type and extent of screening illustrated in this view is very typical of suburban frontage development within the visual study area. Although the turbines contrast with the strong residential character of this view, their overall visual impact is minimal from this viewpoint due to vegetative screening.

Figure 19. Viewpoint 158

Viewpoint 159 (Figure 20)*Existing View*

This view is from Wight Road in the Town of Alabama. It is approximately 0.5 mile from the nearest turbine that would be visible in this view, and is typical of foreground views that are available to local residents in the rural residential/agricultural LSZ. The existing view features a harvested cornfield in the foreground, backed by a complex of farm structures. The farm structures, including a home, barns, storage buildings, and silage bunker, are the dominant features in the view. These structures, along with a cluster of trees on the left-hand side of the view, almost completely block views to more distant landscape features. The level landform, in combination with the buildings, trees, and field edge, create strong horizontal lines in the view.

Proposed Project

With the proposed Project in place, two foreground turbines rise up beyond the line of farm buildings and trees. The nearest structure is centrally located in the view, and is significantly taller than the existing structures. It's vertical line and central location make it a focal point that draws the viewer's eye. Because it is slightly more distant and off to the side, the second turbine is much less dominant and its line and scale contrast less strong. However, both turbines present moderate to strong contrast with the existing vegetation and landform in terms of scale, line, color, and form. Their appearance as part of the farm complex minimizes perceived land use contrast, as the turbines appear appropriate among other utilitarian agricultural structures.

Figure 20. Viewpoint 159

Viewpoint 165 (Figure 21)*Existing View*

This view is from Kenyon Avenue in the Town of Alabama. It is approximately 0.7 mile from the nearest turbine that would be visible, and is typical of the views that are available to residents in the rural residential/agricultural LSZ. The existing view is characterized by an open, level agricultural field in the foreground, backed by a road and a band of hedgerow trees. A farm and house are visible on the opposite side of the trees, and a wooded background ridge can also be seen through the hedgerow. The line of trees creates a strong horizontal line that divides the view between open field and open sky.

Proposed Project

With the proposed Project in place, two turbines appear prominently in the mid-ground. The turbines appear equidistant from the viewer, and balance one another in the view. Their vertical line and mechanical appearance present strong line, scale, and form contrast with the existing features of the landscape, especially the vegetation and landform. The turbines punctuate the sky at a height well above the existing trees, and appear very large. While they clearly become focal points in the view, they appear compatible with the agricultural character of the landscape. One rating panel member felt that the turbines added interest to the view, while the other two members felt that the Project would have a strong negative impact on aesthetic quality from this viewpoint.

Figure 21. Viewpoint 165

Viewpoint 170 (Figure 22)*Existing View*

This view is from Alleghany Road in the Town of Alabama near the Bascom Plot Cemetery, and is typical of what local residents and travelers see from the rural residential/agricultural LSZ. This viewpoint is approximately 1.3 mile from the nearest turbine that would be visible in this view. Open fields with livestock, and an adjacent agricultural building, dominate the foreground, while additional fields and woodlots extend from the mid-ground to a wooded background ridge. Unlike most of the previous viewpoints, long distance views to the background are available from this location. This is due to a lack of foreground and near mid-ground trees, slightly elevated viewer position, and the higher elevation of the background ridge. For all of these reasons, the view has a very open, unenclosed feel, and large expanses of sky, as well as land, are visible. However, these same conditions also limit the visual quality/interest of the view.

Proposed Project

With the proposed Project in place, numerous mid-ground and background turbines appear across the full field of view. The turbines punctuate the level horizon line and their significant height above the existing mid-ground and background trees accentuate their moderate to strong line and scale contrast with the existing features of the landscape. Because of their distance from viewer, the turbines do not dominate the view, but they become focal points and compete with the horses in the foreground for viewer attention. Strong shadowing/backlighting makes some of the turbines very visible against the sky, while turbines that are more distant and/or side lit blend fairly well with the sky color. The number of turbines and their occurrence across the full field of view creates some visual clutter, but the adverse affect is reduced due to their orderly spacing and receding position in the landscape. The large number of visible turbines also indicates a clear change in land use (more industrial), but this use generally appears compatible with the agricultural character of the landscape.

Figure 22. Viewpoint 170

Viewpoint 176 (Figure 23)*Existing View*

This viewpoint is from New Road on the Tonawanda Indian Reservation, approximately 2.4 miles from the nearest turbine that would be visible in this view. It includes elements of the hamlet and rural residential/agricultural LSZs, and is representative of the most open views available to residents and travelers within the Reservation. The existing view features an active agricultural field in the foreground, backed by a road and a cluster of residential and commercial structures. The structures and a band of trees behind them block more distant background views. The existing view has limited visual quality due to lack of topographic and vegetative variability, and the haphazard assemblage of structures and vehicles that make up the dominant elements of the view.

Proposed Project

With the proposed Project in place, several turbines can be seen above the line of trees in the background. At this distance, the turbines appear consistent in scale with the structures and trees in the mid-ground, and do not significantly break/alter the horizon line. Even with fairly strong shadows, color contrast with the sky and existing vegetation in this view is limited. The presence of various man-made features in the view also minimizes the line, form, and texture contrast presented by the turbines. The rating panel felt the Project would have very little overall visual impact from this viewpoint. Any impact the turbines would have is further reduced by the limited aesthetic quality of the existing view.

Figure 23. Viewpoint 176

Viewpoint 182 (Figure 24)

Existing View

This viewpoint is located on Ham Road in Town of Alabama. It is approximately 0.1 mile from the nearest turbine that would be visible, and is typical of foreground distance views that are available in the rural residential/agricultural LSZ. This late afternoon view features expansive agricultural fields in the foreground and mid-ground, which provide a sense of openness, and clear views of the sky and woodlots in the background. Trees and a mid-ground hedgerow break the skyline slightly, and partially screen agricultural buildings and houses beyond them. The topography is gently rolling, and the character is strongly rural and peaceful.

Proposed Project

With the proposed Project in place, numerous turbines can be seen at foreground, mid-ground, and background distances. One turbine is located directly in front of the viewer and extends up out of the picture. At this distance the turbine appears very large, and details, such as its entry door, are clearly visible. The turbines add vertical, man-made elements to the view and present strong contrast in line, scale, color, texture, and form. The combination of turbines in proximity to the viewer and multiple turbines in the view increases visual impact and significantly changes the character of the view. Although one rating panel member felt the turbines added interest and dimension to the view, all of the panel members rated the Project's contrast as incompatible with vegetation, landform or viewer activity at this location.

Figure 24. Viewpoint 182

Viewpoint 205 (Figure 25)

Existing View

This viewpoint is located at the Stafford Pond Observation Point in the Oak Orchard WMA in the Town of Oakfield. It is approximately 5.1 miles from the nearest turbine that would be visible in the view, and is representative of the long distance views toward the Project site that are available to recreational users (birdwatchers, photographers, etc.) from a few open locations within the WMA. The existing view includes an open field in the foreground, backed by an extensive complex of marsh and forested wetland. A gently undulating, wooded background ridge rises just above the mid-ground tree tops. The level topography, bands of trees and marsh land, and cloud patterns, create strong horizontal lines in the view.

Proposed Project

With the proposed Project in place, numerous turbines can be seen rising above the background ridge. The turbines extend from the center to the right-hand side of the view, before disappearing behind foreground trees. The turbines' vertical line contrasts with the strong horizontals in the view, and the height to which the turbines rise above the background ridge accentuates their scale contrast. However, they appear spindly and delicate at this distance, and even when backlit, do not contrast strongly with the color of the sky. The number of turbines visible and their moderate to high contrast in line, scale, and form indicate a change in land use. Because they are the only obvious man-made features in the view, they appear somewhat out of place, and add visual clutter to this otherwise natural landscape. All of the rating panel members felt that the Project had a moderate negative impact from this viewpoint, due primarily to its contrast with the natural character and nature-based recreational use this site receives.

Figure 25. Viewpoint 205

Viewpoint 224 (Figure 26)

Existing View

This viewpoint is from County Highway 52 in the Iroquois National Wildlife Refuge, in the Town of Shelby. It is approximately 5.5 miles from the nearest turbine that would be visible in this view, and is typical of views that are available to recreational users in open portions of the wildlife refuge. The existing view is dominated by open fields and marsh, with patches of open water and widely scattered clumps of trees. A band of woods backs up the marsh in the mid-ground, and an elevated wooded ridge can be seen in the distant background. The expanse of open natural land and lack of visible man-made features gives the view a remote feel and relatively high aesthetic quality.

Proposed Project

With the proposed Project in place, numerous turbines can be seen rising above the background ridge in the center of the view. The turbines are clearly man-made features that appear out of place in this natural setting, and their large size is indicated by the height to which they rise above the ridgeline. They also add some visual clutter to the view. However, due to the effects of distance, their contrast and visual impact is minimized. The turbines appear delicate and spindly, and blend well with the color of the sky and background vegetation. While clearly visible, they are subordinate to the natural features that dominate the foreground and mid-ground view. While two of the rating panel members evaluated the Project's overall contrast and aesthetic impact as low, the third felt it presented high contrast with the natural character of this view and had a moderate negative aesthetic impact from this location. Variability in scoring among the rating panel members was highest for this viewpoint.

Figure 26. Viewpoint 224

Viewpoint 230 (Figure 27)

Existing View

This viewpoint is located on Lewiston Road in the Town of Alabama, near the Wheatville Cemetery. It is approximately 1.7 miles from the nearest turbine that would be visible in this view. The view is typical of those available to residents and local travelers in the rural residential/agricultural LSZ. It features level to gently rolling agricultural fields, separated by broken/sparsely-wooded hedgerows. A barn on the left hand side of the view is the only structure in view, and serves as a focal point that draws the viewer's eye and creates a pleasing visual composition. The gently rising topography and line of trees along the horizon line block views of more distant landscape features.

Proposed Project

With the proposed Project in place, several turbines can be seen above or through the trees that define the horizon line. At this distance, the turbines appear comparable in line and scale to the trees in the hedgerow. The hedgerow also serves to partially screen the turbines, and minimizes their prominence against the open sky. Their color blends well with the overcast sky, and although distinctly new and different elements in the landscape, they remain subordinate to the barn and open fields that define the character of this view. Overall aesthetic impact was considered low by the rating panel.

Figure 27. Viewpoint 230

Viewpoint 239 (Figure 28)

Existing View

This view is from Gorton Road in the Town of Alabama. It is approximately 0.5 mile from the nearest turbine that would be visible, and is typical of foreground views that are available to residents and local travelers in the rural residential/agricultural LSZ. This late afternoon view features a setting sun through high clouds. The landscape is dominated by open agricultural fields separated by wooded hedgerows. A house and garage on the left hand side of the view provide a foreground focal point. Rising topography and hedgerow/woodlot trees block views beyond the mid-ground, except on the far right-hand side of the view, where more distant fields and trees can be seen. Existing aesthetic quality was characterized as low to average by the rating panel.

Proposed Project

With the proposed Project in place, turbines at foreground and mid-ground distances span the view. The turbines Project well into the sky, and at this distance their contrast with the existing vegetation and landform in line, scale, and form is very strong. Backlighting also results in fairly strong color contrast with the background sky. Because of their number and size, the turbines dominate the view and become focal points for the viewer. While not necessarily appearing out of place in an agricultural setting, the turbines are not visual compatible with the residential elements of the landscape. Two of the rating panel members found the Project to have a high degree of aesthetic impact due primarily to the quantity and proximity of visible turbines at this location. The third panel member considered the impact moderate due to the working character of the view and limited viewer sensitivity.

Figure 28. Viewpoint 239

6.0 Visual Impact Assessment Rating

A panel of three registered landscape architects (LA) evaluated the visual impact of the proposed Project, as described in the Methodology section of this report. Utilizing 11 x 17-inch digital color prints of the selected representative viewpoints described above, the rating panel members evaluated the before and after views, assigning each view quantitative visual contrast ratings on a scale of 1 (completely compatible) to 5 (incompatible). Each panel member's ratings were averaged to get an overall score for each viewpoint, and these scores were then compiled as a composite average for each viewpoint. Copies of the completed rating forms are included in Appendix F, and the results of this process are summarized below in Table 4 and Graph 1.

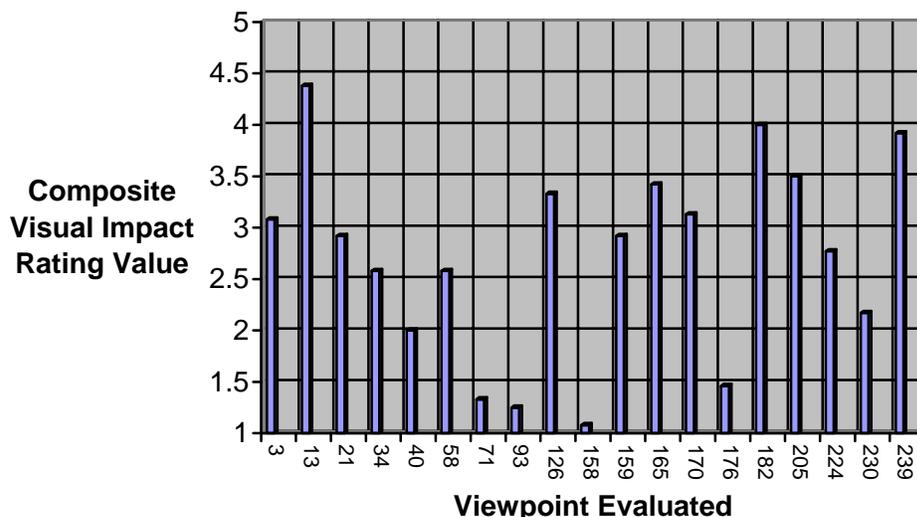
Table 4. Results of Rating Panel Review of Individual Viewpoints

Viewpoint #	Distance (Nearest Turbine in View)	Landscape Similarity Zone (LSZ)	Individual Overall Scores ¹			Composite Score
			LA 1	LA 2	LA 3	
3	0.8	Rural/Agricultural	3.50	3.00	2.75	3.08
13	0.4	Rural/Agricultural	4.25	4.75	4.13	4.38
21	0.9	Rural/Agricultural	3.25	3.00	2.50	2.92
34	1.6	Suburban	2.00	2.00	3.75	2.58
40	2.1	Suburban	1.60	2.00	2.40	2.00
58	2.0	Rural/Agricultural	2.50	2.25	3.00	2.58
71	2.8	Rural/Agricultural	1.25	1.50	1.25	1.33
93	3.8	Suburban/Agricultural	1.00	1.00	1.75	1.25
126	2.0	Rural/Agricultural	3.00	3.25	3.75	3.33
158	0.6	Suburban	1.00	1.25	1.00	1.08
159	0.5	Rural/Agricultural	3.50	2.50	2.75	2.92
165	0.7	Rural/Agricultural	3.75	3.75	2.75	3.42
170	1.3	Rural/Agricultural	3.25	3.75	2.38	3.13
176	2.4	Rural/Hamlet	1.75	1.00	1.63	1.46
182	0.1	Rural/Agricultural	4.25	4.25	3.50	4.00
205	5.1	Wetland	3.00	3.00	4.50	3.50
224	5.5	Wetland	1.80	2.20	4.30	2.77
230	1.7	Rural/Agricultural	2.25	2.25	2.00	2.17
239	0.5	Rural/Agricultural	4.25	4.50	3.00	3.92
Average			2.63	2.63	2.79	2.73

¹On a scale of 1 (completely compatible) to 5 (incompatible).

Graph 1. Results of Rating Panel Review – Composite Score Per Viewpoint

[On a scale of 1 (completely compatible) to 5 (incompatible)]



As Table 4 indicates, individual contrast ratings for the 19 selected turbine viewpoints ranged from 1.0 (completely compatible) to 4.75 (high visual contrast). Composite scores (i.e., the average of individual rating panel members) ranged from 1.25 to 4.00 and 11 viewpoints (58%) received scores of less than the mid-point of 3.0 on the scale of 1 to 5. Scores in this range generally indicate a moderate level of visual contrast. The lowest contrast ratings (under 2.0) were received by Viewpoints 71, 93, 158, and 176. Simulations from these viewpoints were characterized by either more distant views (over 3.5 miles), limited turbine visibility due to screening, or an abundance of man-made elements in the view. All of these conditions tend to decrease turbine visibility and/or contrast with the existing landscape.

The highest contrast ratings were received by Viewpoints 13 and 182. Both of these viewpoints received individual and composite ratings over 4.0 on the 1 to 5 scale. For both of these viewpoints, impact related primarily to the proximity of the turbines to the viewer (under 0.5 mile), and the abundance of turbines within the view, which heightens line, form, and scale contrast with the landscape. These views were also unobstructed by vegetation or topography. Viewpoints 205, 224, and 239 also received individual contrast ratings over 4.0 from one or more of the rating panel members. In the case of Viewpoints 205 and 224, one panel member felt that the Project was incompatible with the natural scenery and nature-based recreation at the wildlife areas where these views are available. This, despite the fact that the turbines were over 5 miles away. In the case of Viewpoint 239, high contrast ratings from two panel members were again related to the number and/or proximity of the visible turbines, although Project compatibility with the working agricultural landscape was noted.

Although there was generally a high degree of consistency among the panel members' ratings, at times the members reacted quite differently to individual simulations (see rating forms in Appendix E). This

reflects individual variability in perception/acceptance of the turbines. A generally positive viewer reaction to wind turbines, with some strong individual variability (based on viewer preference and/or landscape setting), has been observed by EDR on the currently operating projects in New York State (Madison, Fenner, and Maple Ridge). Similar results have been documented in public opinion/acceptance surveys regarding constructed wind power projects in other locations (Bishop and Proctor, 1994; Gipe, 2003; Warren et al., 2006). Based on rating panel results, this reaction will likely be seen on the Alabama Ledge Wind Power Project as well.

Nighttime photos from the Fenner Wind Power Project (Figure 29), indicate that nighttime visual impact could occur at certain viewpoints. The contrast of the aviation warning lights with the night sky is strong in most dark, rural settings, and their presence suggests a more commercial/industrial land use. Viewer attention is drawn by the flashing of the lights, and any positive reaction that wind turbines engender (due to their graceful form, association with clean energy, etc.) is lost at night. While not disturbing (or even strongly perceptible) from roads and other public viewpoints, turbine lighting may be perceived negatively by area residents who may be able to view these lights from their homes and yards.

Figure 29. Representative Evening/Nighttime Photos

7.0 Conclusions

The VIA for the Alabama Ledge Wind Power Project allows the following conclusions to be drawn:

1. Viewshed, mapping, cross section analysis, and field verification indicate that the Project has the potential to be visible from the majority of the study area. However, significant areas are screened by forest vegetation and structures. These areas include most of the Tonawanda Indian Reservation, the Iroquois NWR, the Oak Orchard and Tonawanda WMAs, and the various villages within the study area. In most locations where turbines are visible, significant portions of the the overall Project are likely to be visible. Significant visual effects of wind power projects are generally concentrated within 3.5 miles (6 kilometers) of the Project site (Eyre, 1995). EDR's observations on existing wind power projects (Madison, Fenner, and Maple Ridge Wind Power Projects) indicate that under favorable conditions, views of the wind turbines will likely be available from certain viewpoints well over 10 miles from the Project site. However, visual impact at these distances is typically minimal.
2. Several visually sensitive resources and areas of intense land use within 5 miles could be impacted by the Project. These include the portions of the Finger Lakes Trail, sections of the NYS Thruway and open areas within the Tonawanda Indian Reservation and the Iroquois NWR, Oak Orchard WMA, and Tonawanda WMA. From other sensitive sites within the study area, including the Onondaga Escarpment Unique Area, Oak Orchard Creek Marsh, most of the trails in the WMAs and NWR, and most areas of concentrated human settlement, the Project will either not be visible or will be significantly screened by foreground vegetation and structures.
3. Simulations of the proposed Project, indicate that the visibility and visual impact of the wind turbines will be highly variable, based on landscape setting, extent of natural screening, presence of other man-made features in the view, viewer sensitivity, and distance of the viewer from the Project.
4. Evaluation by a rating panel of landscape architects indicates that the Project's overall contrast with the visual/aesthetic character of the area will generally be moderate. However, based on the panel's scoring and comments, this may not be the case where foreground and near mid-ground views of turbines (i.e., under 1.0 mile) are available, where multiple turbines span the field of view, and/or where the turbines appear out of context/character with the landscape (e.g., are viewed from a wildlife refuge). However, in most cases the panel felt the Project was compatible with the working agricultural landscape that makes up the majority of the visual study area. Based on experience with currently operating wind power projects elsewhere, public reaction to the Project is likely to be generally positive, but highly variable based on proximity to the turbines, the affected landscape, and personal attitude of the viewer regarding wind power. As Stanton (1996) notes, although a wind power project is a man-made facility, what it represents "may be seen as a positive addition" to the landscape.
5. Based upon the nighttime photos/observations of existing wind power projects, the panel felt that the red flashing lights on the turbines could result in a nighttime visual impact on certain viewers. The actual significance of this impact from a given viewpoint will depend on how many turbines are

visible, what other sources of lighting are present in the view, the extent of screening provided by structures and trees, and nighttime viewer activity/sensitivity. However, it was felt that night lighting could be somewhat distracting and have an adverse effect on rural residents that currently experience dark nighttime skies. It should be noted that nighttime visibility/visual impact will be reduced on this Project due to 1) FAA lighting guidelines which typically result in aviation warning lights on only about one third to one half the turbines, 2) the abundance of woodlots and hedgerows that screen portions of the Project from most locations, and 3) the concentration of residences in villages, hamlets, and along highways where existing lights already compromise dark skies and compete for the viewer's attention.

6. The analyses included in this study indicate that the Project will generally not be visible from the City of Batavia, and various villages and hamlets (Akron, Oakfield and others) where structures listed or potentially eligible for listing on the National Register of Historic Places are concentrated. Views of the Project will generally be fully or partially screened by structures and trees. However, given the occurrence of potentially Register-eligible structures within 10 miles of the Project site, views of turbines from some historic structures/sites are possible. The simulations prepared for this VIA are representative of worst case views that could be available from potentially Register-eligible structures within the 5 mile-radius study area.
7. Mitigation options are limited, given the nature of the Project and its siting criteria (tall structures typically located in open fields). However, in accordance with DEC Program Policy (NYSDEC, 2000), various mitigation measures were considered. These included the following:
 - A. Screening. Due to the height of individual turbines and the geographic extent of the proposed Project, screening of individual turbines with earthen berms, fences, or planted vegetation will generally not be effective in reducing Project visibility or visual impact. However, selective, off-site planting could be effective in screening views from some cemeteries in the area (see Viewpoints 126, 170 and 230A as examples). A visual mitigation planting fund may be established to screen views of the Project from Register-eligible historic sites within the study area.
 - B. Relocation. Again, because of the extent of the Project, the number of individual turbines, and the variety of viewpoints from which the Project can be seen, turbine relocation will generally not significantly alter visual impact. Where visible from aesthetic resources of statewide significance within the study area, (e.g., Iroquois NWR, Finger Lakes Trail, Tonawanda WMA) numerous turbines are likely to be visible, and relocation of individual machines would have little effect on overall visual impact. Elsewhere within the study area, views of the Project are highly variable and include different turbines at different vantage points. Therefore, turbine relocation would generally not be effective in mitigating visual impacts.
 - C. Camouflage. The white color of wind turbines (as mandated by the FAA) generally minimizes contrast with the sky under most conditions. This is demonstrated by simulations prepared under a variety of sky conditions. Consequently it is recommended that this color be utilized on the Alabama Ledge Project. The size and movement of the turbines prevents more extensive

camouflage from being a viable mitigation alternative (i.e., they cannot be made to look like anything else). Neilson (1996) notes that efforts to camouflage or hide wind farms generally fail, while Stanton (1996) feels that such efforts are inappropriate. She believes that wind turbine siting "is about honestly portraying a form in direct relation to its function and our culture; by compromising this relationship, a negative image of attempted camouflage can occur."

- D. **Low Profile.** A significant reduction in turbine height is not possible without significantly decreasing power generation. To off-set this decrease, additional turbines would be necessary. There is not adequate land under lease to accommodate a significant number of additional turbines, and a higher number of shorter turbines would not necessarily decrease Project visual impact. In fact, several studies have concluded that people tend to prefer fewer larger turbines to a greater number of smaller ones (Thayer and Freeman, 1987; van de Wardt and Staats, 1988). The visual impact of the electrical collection system is being minimized by placing the majority of the collection system underground. Overhead lines have only been proposed to navigate one area of steep slope and to get across the gypsum mine. The height of overhead collection poles will likely be 50-60 feet. These poles will be obscured from many viewpoints within the project area by trees or other vegetation. Overhead poles will for the most part be sited at the back or sides of parcels to reduce their visibility from adjacent roads or houses.
- E. **Downsizing.** Reducing the number of turbines could reduce visual impact from certain viewpoints, but from most locations within the study area where numerous turbines are visible, unless this reduction were drastic, the visual impact of the Project would change only marginally. A dramatic reduction in turbine number (e.g., reduction by 50%) would make the Project economically unviable.
- F. **Alternate Technologies.** Alternate technologies for power generation would have different, and perhaps more significant, visual impacts than wind power. Alternative utility-scale wind power technologies, that would significantly reduce visual impacts, do not currently exist.
- G. **Nonspecular Materials.** Non-reflective paints and finishes will be used on the wind turbines to minimize reflected glare. Nonspecular conductor will be used on the above-ground sections of the electrical collection system.
- H. **Lighting.** Turbine lighting will be kept to the minimum allowable by the FAA. Medium intensity red strobes will be used at night, rather than white strobes or steady burning red lights. The feasibility of upwardly-directed lighting fixtures or light shields should be explored to minimize nighttime visual impacts on nearby residents (see information on shields in Appendix G).
- I. **Maintenance.** The turbines and turbine sites will be maintained to ensure that they are clean, attractive, and operating efficiently. Research and anecdotal reports indicate that viewers find wind turbines more appealing when the rotors are turning (Stanton, 1996). In addition, the Project developer will establish a decommissioning fund to ensure that if the Project goes out of service and is not repowered/redeveloped, all visible above-ground components will be removed.

- J. Offsets. Correction of an existing aesthetic problem within the viewshed is a viable mitigation strategy for wind power projects that result in significant adverse visual impact. Historic structure restoration/maintenance activities may be undertaken to mitigate potential impacts on cultural resources.

In addition to the mitigation measures described above, other measures that will reduce or mitigate visual impact have been incorporated into the Project design. These include the following:

- Compliance with all required set-backs from roads and residences.
- All turbines will have uniform design, speed, color, height and rotor diameter.
- Towers will include no exterior ladders or catwalks.
- The Project operations and maintenance building (although not yet designed) will reflect the vernacular architecture of the area (i.e., resemble an agricultural structure).
- New road construction will be minimized by utilizing existing farm lanes whenever possible.
- The placement of any advertising devices on the turbines will be prohibited.

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Appendix A

NYSDEC Visual Policy

Appendix B

Visual Simulation Process

Appendix C

Sensitive Site Table
&
Large Scale Viewshed Maps

Appendix D

Photo Log and Field Notes
(See enclosed CD)

Appendix E

Digital Simulations
(See enclosed CD)

Appendix F

Visual Impact Assessment Rating Forms
(See enclosed CD)

Appendix G

Information on Turbine Light Shield

Appendix H

Resumes of Involved Landscape Architects