SARATOGA ASSOCIATES

BALL HILL WIND PROJECT
SUPPLEMENTAL VISUAL RESOURCE ASSESSMENT

Prepared for:
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#2015-039.10M

Ball Hill Wind Project – Supplemental Visual Resource Assessment

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1.0 INTRODUCTION

Ball Hill Wind Energy, LLC is proposing to develop a wind-powered electrical-generating facility consisting of up to 36 turbines with a maximum capacity between 79 and 100 megawatts (MW). The proposed Ball Hill Wind Project (also referred to as the "Project") will be located in the Towns of Villenova and Hanover, Chautauqua County, New York. An electrical substation, switchyard, and an approximately 5.8-mile 230 kV above ground transmission line will be located in the Town of Hanover.

Since the submission of the Ball Hill Windpark Draft Environmental Impact Statement (DEIS), the Project layout has been revised resulting in fewer yet taller turbines. Based on these changes, it was determined that a Supplemental Draft Environmental Impact Statement (SDEIS) would be needed. As part of the SDEIS being prepared for the permitting of this Project, Saratoga Associates, Landscape Architects, Architects, Engineers, and Planners, P.C. (Saratoga Associates) completed a Supplemental Visual Resource Assessment (SVRA) of the Project. This SVRA presents an updated version of the *Noble Ball Hill Windpark Visual Resource Assessment* (Saratoga Associates, 2008). The original report completed in 2008 has been revised to reflect the changed layout and number of turbines, as well as address previous questions raised by the community and reviewing agencies.

1.1 METHODOLOGY

Consistent with Visual Resource Assessment (VRA) practice, this report evaluates the potential visibility of the proposed Project and objectively determines the difference between the visual characteristics of the landscape setting with and without the Project in place. The process follows basic New York State Department of Environmental Conservation Program Policy "Assessing and Mitigating Visual Impacts" (NYSDEC 2000) (DEC Visual Policy) and State Environmental Quality Review (SEQRA) criteria to minimize impacts on visual resources. This DEC Visual Policy requires a visual assessment when a proposed facility is potentially within the viewshed of a designated aesthetic resource.

There are no specific Federal rules, regulations, or policies governing the evaluation of visual resources. However, the methodology employed herein is based on standards and procedures used by the U.S. Department of Agriculture (National Forest Service, 1974, 1995), U.S. Department of the Interior, Bureau of Land Management (USDOI, 1980), U.S. Department of Transportation, Federal Highway Administration (USDOT, 1981), NYS Department of Transportation (NYSDOT, 1988), and the NYS Department of Environmental Conservation (NYSDEC, July 31, 2000).

The visual impact assessment includes the following steps:

- Define the existing landscape character/visual setting to establish the baseline visual condition from which visual change is evaluated;
- Conduct a visibility analysis (viewshed mapping and field investigations) to define the geographic area surrounding the proposed facility from which portions of the Project might be seen;

- Identify sensitive aesthetic resources to establish priority places from which further analysis of potential visual impact is conducted;
- Select key receptors from which detailed impact analysis is conducted;
- Depict the appearance of the facility upon completion of construction;
- Evaluate the aesthetic effects of the visual change (qualitative analysis) resulting from Project construction, completion and operation; and,
- Identify opportunities for effective mitigation.

Consistent with the DEC Visual Policy, the study area for this SVRA generally extends to a five-mile radius from the outermost turbines (hereafter referred to as the "five-mile study area" or "study area"). Beyond this distance it is assumed that natural conditions of atmospheric and linear perspective will significantly mitigate most visual impacts. However, considering the scale of the proposed Project and recognizing the proposed wind turbines will, at times, be visible at distances greater than five (5) miles, site-specific consideration is given to resources of high cultural or scenic importance that are located beyond the typical five-mile radius.

1.2 Project Description

The Project area is located in Western New York, approximately 60 miles northeast of Erie, Pennsylvania, 50 miles southwest of Buffalo, and 25 miles north of Jamestown. The Project includes 36 energy-generating turbines located in the Towns of Villenova (28 turbines) and Hanover (8 turbines). Generally, the turbines are bounded by NYS Route 39 to the north, County Route (CR) 93 to the east, NYS Route 83 to the south, and Empire and Round Top Roads to the west. Turbines will be located on private land under lease agreement with property owners.

Each turbine will include a tall steel tower; a rotor consisting of three composite blades; and a nacelle, which houses the generator, gearbox, and power train. A transformer may be located in the rear of each nacelle, or adjacent to the base of the tower, to raise the voltage of the electricity produced by the turbine generator to the voltage level of the collection system (34.5 kV). The color of the blades, nacelle, and tower will be off-white. The towers will be a tapered tubular steel monopole tower.

Ball Hill Wind Energy, LLC proposes to install Vestas 110-2.0 MW, General Electric (GE) 116-2.3 MW, or similar turbines with a maximum height of 500 feet. For the purpose of this assessment 36 GE 116-2.3 turbines were analyzed. These turbines will have a hub height of 308 feet (94 meters) and a rotor diameter of 380 feet (116 meters) resulting in an apex of blade rotation reaching approximately 498 feet. The rotor and nacelle will be mounted on a tubular steel tower with the tower being approximately 16 feet in diameter at the base and eight (8) feet in diameter at the hub. The maximum operating rotational speed of the blades should not be greater than approximately 14.9 revolutions per minute (rpm) or about one revolution every four (4) seconds.

In addition to the wind turbines, the Project will involve the construction of gravel access roads, interconnection cables, a transmission line, an operation and maintenance facility, and an electrical

substation and switchyard. It is anticipated that the interconnection cables (between the turbines) will be buried, unless engineering and environmental issues are encountered.

Prior to construction, multiple laydown areas will be placed in strategic locations throughout the Project area. These laydown areas will vary in size from two (2) to 10 acres, initially disturbing a total of 26.2 acres of land. The operations and maintenance (O&M) building with parking, construction storage/work area, and the associated driveway will occupy approximately 2.8 acres on North Hill Road in the Town of Villenova. This facility will provide a base of operations for the Project. The area where the O&M building will be sited is used for agricultural purposes and is currently planted with a field crop of hay. The area will be graded, graveled, and enclosed with a six-foot fence and entrance gate. Construction trailers will be placed in the area with temporary services including electrical power, telephone, and restroom facilities. The O&M building will be a metal construction, approximately 7,000 square feet, and include managerial offices, monitoring stations, and a storage area for parts and small equipment. At the conclusion of the project, approximately 23.4 acres of the laydown area will be reclaimed and reseeded, leaving only the O&M building and an area designated for parking.

Typical O&M Building and Side Yard

A proposed 5.8-mile overhead 230 kV transmission line will be constructed to connect the turbines with an existing National Grid 230 kV transmission line in the Town of Hanover. This connection will occur at a three-acre± switchyard located near the northern terminus of the overhead transmission line approximately 1,300 feet southeast of the intersection of Bennett State Road (CR 85) and Stebbins Road (CR 86) in the Town of Hanover. Also, an approximately 1.2 acre substation will be located at the southern terminus of the overhead transmission line approximately 800 feet north of Hurlbert Road in the Town of Hanover.

1.3 Aviation Obstruction Marking and Lighting

According to the Federal Aviation Administration (FAA), daytime lighting of wind turbines, in general, is not necessary. Turbines themselves, due to their solid construction, as well as their moving characteristics, provide sufficient warning to pilots during daytime conditions, and all document terrain and sky conditions. The FAA recommends that turbines be painted either bright white, or a slight shade from white, to provide maximum daytime conspicuity.

The FAA requires lighting of perimeter turbines, as well as interior turbines with a maximum gap between lit turbines of no more than ½ mile (2,640 feet). Based on these guidelines and the evaluated 36-turbine layout, approximately 22 of the proposed turbines may be illuminated at night for aviation

safety.[1] One aviation obstruction light will be affixed to the rear portion of the nacelle on each turbine to be illuminated.

Lighting may be L-864 red flashing lights, in the form of incandescent or rapid discharge (strobe). The FAA recommends red light emitting diode or rapid discharge style L-864 fixtures to minimize impacts on neighboring communities, as the fixtures' exposure time is minimal, thus creating less of a nuisance. All light fixtures within the Project must flash in unison, thus delineating the Project as one (1) large obstruction to pilots.[2] L-864 red flashing aviation obstruction lights are designed to emit light in an upward direction with maximum visibility for pilots. The L-864 unit is a low intensity light emitting 2,000 candelas[3] and is commonly used on turbines, communication towers, and other tall structures found throughout the study region.

[1] The FEIS will contain a formal lighting plan. The number of lit turbines is subject to change.
[2] U.S. Department of Transportation, Federal Aviation Administration, "*Development of Obstruction Lighting Standards for Wind Turbine Farms*" (DOT/FAA/AR-TN05/50, November 2005).
[3] Candela is the unit of luminous intensity, equal to one lumen per steradian (lm/sr).

2.0 LANDSCAPE CHARACTER/VISUAL SETTING

Landscape character is defined by the basic pattern of landform, vegetation, water features, land use, and human development. This descriptive section offers an overview of the intrinsic visual condition of the study region and establishes the baseline condition from which to evaluate visual change.

2.1 TOPOGRAPHY

The proposed Project occupies a small portion of the northern edge of the Cattaraugus Highlands, which is a sub-region of the Allegheny Plateau, and the Erie-Ontario Plain, which is a sub-region of the Great Lakes Plain. The topography within the study area rises quickly from the gently sloping land bordering Lake Erie, to a series of undulating ridge tops with deeply cut generally north-south aligned ravines and valleys. Elevation throughout the study area averages 1,000 to 1,500 feet above sea level. The uplands are defined by relatively broad undulating plateaus, such as those around Boutwell Hill State Forest and Canadaway Creek Wildlife Management Area. Elevations in these areas generally range between 1,725 feet to 2,150 feet above sea level. Terrain throughout the study area consists largely of undulating hills, ridges and areas of smaller rounded hillocks, often bisected by ravines.

2.2 VEGETATION

Dominant tree species within the study area are representative of the northern hardwood zone found throughout much of the Western New York Region. Species include beech, maple, ash, elm, and hemlock. In addition to these deciduous climax species, isolated plantings of red and white pine are scattered throughout the study area. Coinciding with the mix of open field and woodlots is a significant amount of secondary growth edge habitat. For the most part, this secondary growth takes the form of hedgerows, wood borders, and old fields. Beyond the Project area, the landscape remains primarily rural agriculture, with the exceptions of the Villages of South Dayton and Forestville, which each feature greater housing and business density, as well as tree-lined streets.

Some of the highest vegetation density within the study area is found within the Boutwell Hill Management Unit, which is comprised of Canadaway Creek Wildlife Management Area to the north and Boutwell Hill State Forest to the south. The dominant tree species in the Unit is northern hardwood, with some Allegheny hardwoods as well. Ninety-four percent of the Boutwell Hill Management Unit is classified as commercial forest.

2.3 WATER FEATURES

Water features are not a major component of the visual landscape in the vicinity of the proposed wind farm. The most prominent water resources within the study area include Big Indian Creek, Blaisdell Creek, Canadaway Creek, North and West Branch of the Conewango Creek, Silver Creek, Slab City Creek, Walnut Creek and Tupper Creek. Additional notable resources include, but are not limited to, Black Pond, East and West Mud Lake, and the Silver Creek Reservoir. Numerous private farm ponds, scattered wetlands, and small streams are also found in the study area.

Is should also be noted, that the largest water feature in the area, Lake Erie, is approximately 7.0 miles from the nearest turbine.

2.4 TRANSPORTATION

NYS Routes 39, 83, and 322, are the primary transportation thoroughfares in the study area. These roads generally run west to east. NYS Route 39 enters the study area from the Town of Sheridan and exits the study area through the Village of Perrysburg. This road is located just north of the Project area with the closest turbine proposed to be located within 0.50 miles of the road. NYS Route 83 enters the study area in the Town of Arkwright and exits through the Town of Cherry Creek. NYS Route 322 begins in the Hamlet of Balcom in the Town of Cherry Creek, continuing eastward where NYS Route 322 breaks off to the south. In addition to these, the NYS Thruway (I-90) runs through the northernmost part of the study area in the Town of Hanover for a length of approximately two (2) miles.

A number of county routes are also located within the study area. Among these, CRs 72, 77, 85, 87, 88, 89, and 93 are within Chautauqua County, and CR 2 and 78 are within Cattaraugus County. The CRs within the study area connect numerous hamlets and Villages, and serve as the primary transportation routes outside the NYS Routes within the study area.

2.5 POPULATION CENTERS

Community Centers – Within the study area are two (2) villages. These larger community centers include the Villages of Forestville and South Dayton and are located entirely within the study area.

Village of Forestville – The Village of Forestville is located in the Town of Hanover, approximately 2.5 miles northeast of the nearest turbine. The street pattern in this small Village exhibits an organic configuration with several County Roads intersecting the main street (NYS Route 39) at indirect angles. A central median divides NYS Route 39 in Forestville marking the village center. Commercial establishments (service facilities and offices) are generally clustered along NYS Route 39 (Main Street). The Forestville Elementary, Middle and High Schools are located south of Academy Street. Low to moderate density single-family housing is found within portions of the Village. Residential dwellings tend to be older and well maintained with mature vegetation lining many roadways. Development density drops sharply outside the Village center.

Village of Forestville – Village center. (photo credit – ESRI)

Activities within the Village of Forestville are generally related to small business, local shopping, and residential uses.

Village of South Dayton – The Village of South Dayton is located in the Town of Dayton, approximately 2.8 miles southeast of the nearest turbine. Roads in this Village exhibit a moderate grid-like pattern with several residential roads connecting back to Main Street or NYS Route 322 (Pine Street). A focal point of the community is a well defined "village green," (includes a gazebo, park benches, and informal picnicking area) that is bound by NYS 322 (Pine Street), Maple Street, Railroad Street, and Park Avenue. Commercial establishments (service facilities and offices) are generally clustered along NYS Route 322 (Pine Street) and adjacent to the "village green". Industrial uses are also evident within the southeastern portion of the Village, generally situated around the railroad tracks. Low to moderate density single-family housing is found throughout the Village. Residential dwellings tend to be older and well maintained with mature vegetation and sidewalks lining many roadways. Development density drops sharply outside the Village center.

Village of South Dayton – Village center. (photo credit – ESRI)

Activities within the Village of South Dayton are generally related to small business, local shopping, recreation, and residential uses.

Rural Residential Areas – Outside of those communities identified above, homes and agricultural support buildings are either clustered at crossroad hamlets (varying in size), such as Hamlet, Black Corners, and Balcom Corners, or are very sparsely located on individual properties. A mix of old and new residences, and accessory structures (barns, garages, etc.) are often found in roadside locations, however many are located on isolated lots out of view from local roads. Rural homes range in quality from well maintained single-family frame construction to older housing stock in need of repair. Mobile homes, of varying vintage, are also a common housing type and are generally located on isolated lots or within mobile home parks.

3.0 VISUAL IMPACT ASSESSMENT

3.1 VIEWSHED MAPPING (ZONE OF VISUAL INFLUENCE)

3.1.1 Viewshed Methodology

The first step in identifying potentially affected visual resources is to determine whether or not the Project would likely be visible from a given location. Viewshed maps are prepared for this purpose. Also known as defining the zone of visual influence, viewshed mapping identifies the geographic area within which there is a relatively high probability that some portion of the proposed Project would be visible.

Viewshed mapping identifies the geographic area within which there is a possibility that some portion of the Project would be visible from a given location. Control points were established at the turbine high points (498 feet) for each of the 36 turbines being evaluated. The resulting viewshed identifies the geographic area within the five-mile study area where some portion of the Project is theoretically visible. The primary purpose of this exercise is to provide a general understanding of a project's potential visibility and identify areas where further investigation is appropriate.

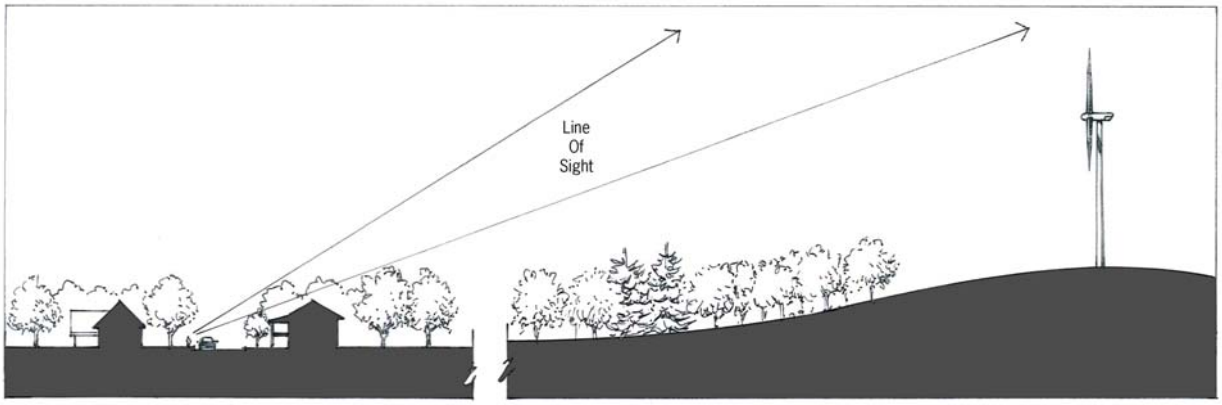
The first viewshed map was prepared defining the area within which there would be no visibility of the Project because of the screening effect caused by intervening topography (See Figure 1). This treeless condition analysis is used to identify the maximum potential geographic area within which further investigation is appropriate. A second map was prepared illustrating the probable screening effect of existing mature vegetation. This vegetated condition viewshed acceptably identifies the geographic area within which one would expect the Project to be screened by intervening forest vegetation (See Figure 2).

For this evaluation, ArcGIS and ArcGIS Spatial Analyst software were used to generate viewshed areas based on publicly available digital topographic and land cover datasets. Viewshed maps were created using a ten-meter resolution digital elevation model (DEM) of the study area. The computer then scanned from each control point to all cells within the DEM, distinguishing between grid cells that would be hidden from view and those that would be visible based solely on topography. All grid cells within the study area were coded based on the number of proposed turbines that would be visible to a theoretical observer whose eye height is conservatively estimated at two meters above ground level.

Vegetation data (land cover and canopy closure) was extracted from the National Land Cover Data Set (NLCD), which depicts cover types in a 30-meter resolution raster graphic. The screening effect of vegetation was incorporated by including an additional 40 feet (12.2 meters)[4] of height for those DEM grid cells that are forested (according to NLCD dataset) and then repeating the viewshed calculation procedure. Forested areas were then removed from the viewshed to account for areas located within a full forest canopy.

[4] A tree height of 40 feet is considered conservative, as most trees in forested portions of the study area appear to be taller than 40 feet.

The NLCD dataset does not depict small vegetation lots (i.e. landscape vegetation), hedgerows, or built structures and may therefore overestimate the potential visibility. This is a particularly important distinction in the populated areas such as the Village of Forestville, or other commercial and residential areas where structures are likely to provide significant screening of distant views. Conversely, recently cleared lots within the study area may not be reflected in the NLCD data.



Screening caused by structures and vegetation is often found in community centers. This causes a viewers "line of sight" to the turbine to be obstructed. Cross-section not to scale.

Identified viewshed areas are further quantified to illustrate the number of turbines that may be visible from any given area. This cumulative degree of visibility is summarized on each map using the following groupings:

- 1-5 turbines visible;
- 6- 10 turbines visible;
- 11-15 turbines visible;
- 16-20 turbines visible;
- 21-25 turbines visible; and
- 26-36 turbines visible.

By themselves, the viewshed maps do not determine how much of each structure is visible above intervening landform or vegetation (e.g., 100%, 50%, 10% etc. of total turbine height), but rather the area within which there is a relatively high probability (theoretical visibility) that the top of one or more turbines would be visible. Also, these maps do not account for the viewer's distance from each visible turbine or the aesthetic character of what may be seen. Their primary purpose is to assist in determining the potential visibility of the Project from the identified visual resources.

3.1.2 Nighttime Visibility

A viewshed map (See Figure 3) was also created to assist in the evaluation of potential nighttime visibility. The development of the this viewshed map used the same methodology as described above; however, the map was created using the approximate height (318 feet) of the FAA required lights as the control point for 22 selected turbines.

3.1.3 Verification of Viewshed Accuracy

Because the viewshed map identifies the geographic area within which one or more of the proposed turbines could theoretically be visible, but does not specify which of the 36 turbines evaluated would be within view, it is not readily feasible to field confirm viewshed accuracy. While it is common practice to field confirm viewshed maps prepared for a single study point through the use of balloon study or more intuitive means, the inability to field confirm viewshed accuracy is unique to analysis of multiple point projects covering a large geographic area, such as wind energy projects.

To help determine the accuracy of the vegetation data used for viewshed development, the NLCD data set was overlaid on color aerial images of the study area and reviewed for consistency. While minor inconsistencies were noted, including areas of recently cleared lands, areas of inactive/ abandoned agricultural land showing a degree of pioneer species growth, and areas of non-forest vegetative cover (e.g. Village of South Dayton), the vast majority of woodland areas visible on the satellite image were consistent with the NLCD overlay.

3.1.4 Viewshed Interpretation

Table 1 indicates the degree of theoretical visibility illustrated on the viewshed maps within the five-mile radius study area.

Table 1 Viewshed Coverage Summary

	Topography Only Viewshed (Figure 1 – Topographic Viewshed)		**Vegetation and Topography Viewshed** (Figure 2 - Vegetated Viewshed)	
	Acres	**Percentage of Study Area**	**Acres**	**Percentage of Study Area**
No Structures Visible	17,414	17.2%	68,131	67.1%
1-5 Structures Visible	6,937	6.8%	6,806	6.7%
6-10 Structures Visible	5,840	5.8%	4,841	4.8%
11-15 Structures Visible	6,107	6.0%	4,675	4.6%
16-20 Structures Visible	7,602	7.5%	4,813	4.1%
21-25 Structures Visible	12,183	12.0%	4,144	4.1%
26-36 Structures Visible	45,379	44.7%	8,683	8.6%
Total	101,462	100.0%	101,462	100.0%

*Table 1 and Figure 1 illustrate that one (1) or more structures are theoretically visible from approximately 82.8 percent of the five-mile study radius. However, as discussed above, this unrealistic treeless condition analysis is used only to identify the maximum potential geographic area within which further investigation is appropriate. The topography only viewshed is not representative of the anticipated geographic extent of visibility and is not intended for public interpretation. Acreage is rounded to the nearest whole number in Tables 1 and 2.

Based on the vegetated viewshed (Table 1 and Figure 2), one (1) or more of the proposed turbines will be theoretically visible from approximately 32.9 percent of the five-mile radius study area. Approximately 67.1 percent of the study area will likely have no visibility of any wind turbines. Visibility is most common in the agricultural uplands from cleared lands with vistas in the direction of turbine groupings.

The vegetated viewshed map shows that the Project will be visible within portions of the Villages of Forestville and South Dayton. Most of the visibility shown within these villages will be further

screened by structures and localized vegetation. From the downtown sections of both villages, potential Project visibility appears to be minimal, when present at all. Within the Village of Forestville, potential for visibility is greatest along NYS Route 39 just west of the village center and filtered views are possible along short segments of Ceder and Chestnut Roads. Potential visibility, within the Village of South Dayton, generally occurs south of NYS Route 322. Views of the Project were noted along sections of 1st Avenue, 2nd Avenue and Main Street. Direct and, in some cases, open views are more prevalent on the outskirts of these community centers where localized residential and commercial structures, street trees and site landscaping are less likely to provide a visual barrier. Visibility of the Project may also be available within the hamlets scattered throughout the study area.

Open views of the Project will be available from many roadways where roadside vegetation is lacking. These roadways would include, but are not limited to, the NYS Thruway, NYS Routes 39, 83, and 322, County Routes 93, Prospect/Ball Hill Road, North and South Hill Road, Pope Hill Road, Round Top Road, Aldrich Hill Road, Hanover Road, and Flucker Hill Road. Many of these views may be long distant (background view), fleeting as viewers pass in vehicles, or short in duration. Visibility along roads that intersect the immediate project area is generally greater than visibility from roads farther away. The portion of Prospect/Ball Hill Road that bisects the Project area from southeast to northwest has the greatest visibility of any road immediate to the Project area. Turbines will be visible on both sides of Prospect/Ball Hill Road, as well as Bartlett Hill Road, North Hill Road, Smith Road, Dye Road, Pope Hill Road, and Round Top Road. In these locations, it is anticipated that 360-degree views of the Project may be visible. Open views of the Project will also occur in the agricultural uplands from cleared lands with down-slope vistas in the direction of the proposed Project (e.g. lands south of NYS Route 322).

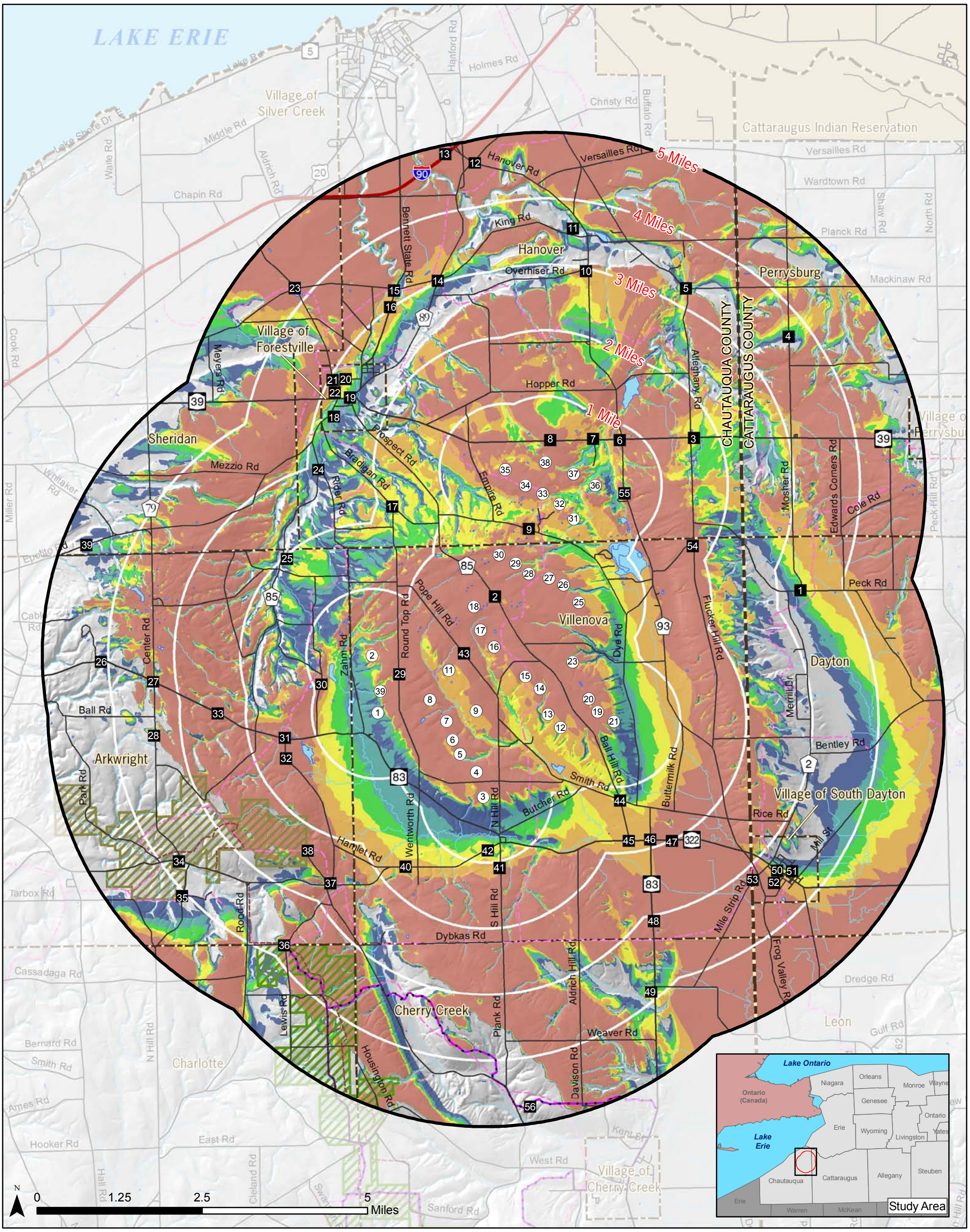
No views, or limited views will occur on the backside of the many hills and within ravines found throughout the five-mile study area. Where topography is oriented toward the turbines, dense forest cover commonly prevents distant views.

As illustrated in Table 2 and Figure 3, the viewshed map indicates that one (1) or more of the 22 FAA required light sources will theoretically be visible from approximately 28.6 percent of the five-mile radius study area. Approximately 71.4 percent of the study area will likely have no visibility of any proposed light sources. Views of the lit proposed turbines would be possible from sections of the Villages of Forestville and South Dayton, and Hamlets such as Hamlet, Balcom, Balcom Corners and Skunks Corner. However, visibility will be most evident in the agricultural uplands from cleared lands with down-slope vistas in the direction of the proposed Project, and participating Project properties with lit turbines. In addition, views of the lit turbines are prominent from a number of roadway segments in

Table 2 FAA Viewshed Coverage Summary

	Vegetation and Topography Viewshed (Figure 3 – FAA Navigation Light Vegetated Viewshed)	
	Acres	**Percent cover**
No Structures Visible	72,426	71.4%
1-5 Structures Visible	12,280	12.1%
6-10 Structures Visible	7,767	7.6%
11-15 Structures Visible	6,529	6.4%
16-20 Structures Visible	2,003	2.0%
21-22 Structures Visible	457	0.5%
Total	101,462	100.0%

the study area, including the NYS Thruway, NYS Routes 39, 83, and 322, County Routes 93 and 87, North and South Hill Road, Pope Hill Road, Farrington Hollow Road, Round Top Road, and Flucker Hill Road.



TOPOGRAPHIC VIEWSHED

Ball Hill Wind Project

Figure 1
December 2015

Turbine locations, pads, access roads, transmission line ROWs, and collector line ROWs reflect November 6, 2015 layout.

KEY

- ① Proposed Wind Turbine
- 1 Sensitive Resource
- Earl Cardot Eastside Overland Trail
- Equestrian Trail
- Snowmobile Trail
- County Boundary
- Municipal Boundary
- Cattaraugus Indian Reservation
- Water Body
- State Forest
- Wildlife Management Area

Number of Visible Turbines

- 1 - 5
- 6 - 10
- 11 - 15
- 16 - 20
- 21 - 25
- 26 - 36

PROJECT # 2015 - 15039.10

This map is computer generated using data acquired by Saratoga Associates from various sources and is intended only for reference, conceptual planning and presentation purposes. This map is not intended for and should not be used to establish boundaries, property lines, location of objects or to provide any other information typically needed for construction or any other purpose when engineered plans or land surveys are required.

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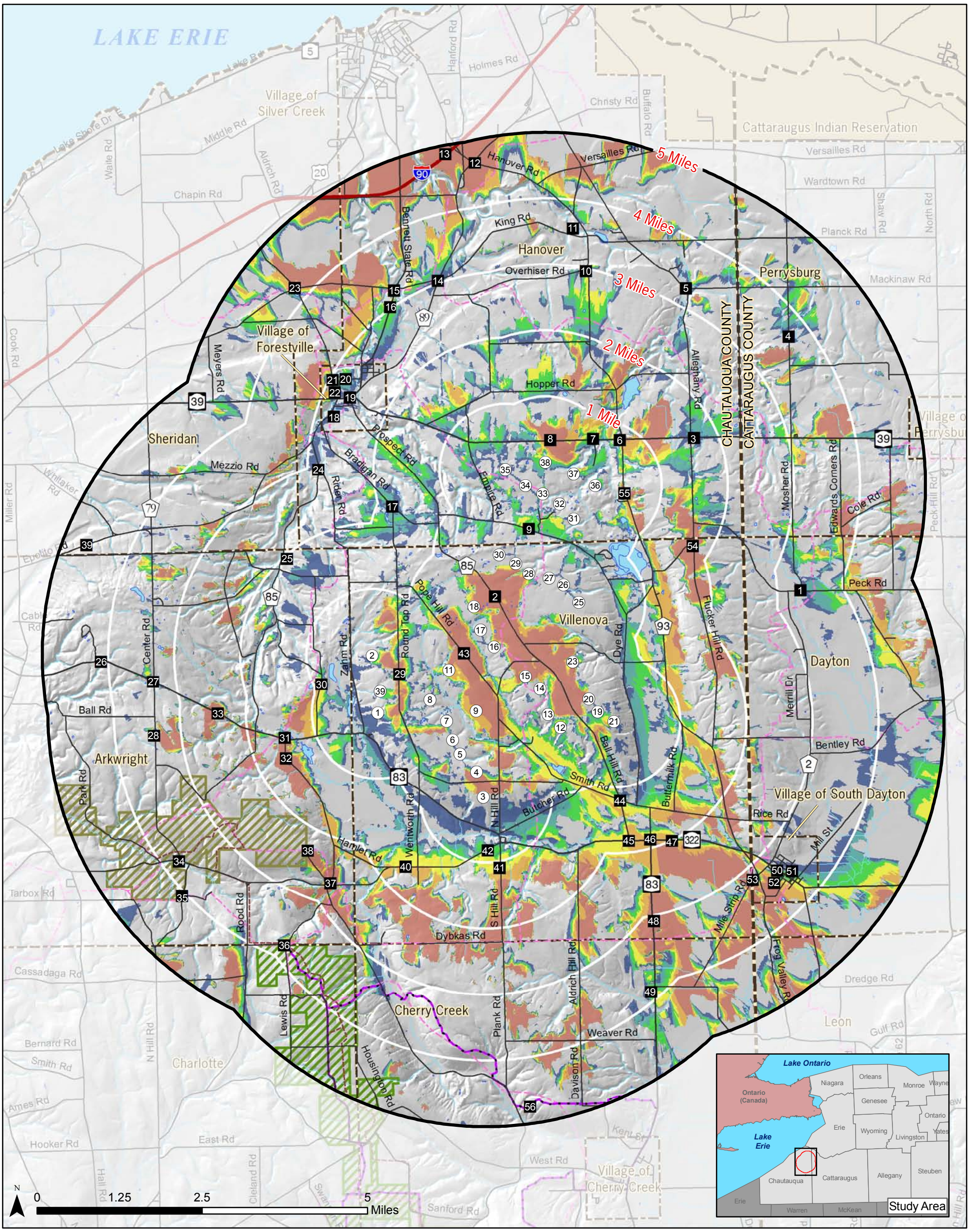

VEGETATED VIEWSHED*

Ball Hill Wind Project

*Assumes 40 foot (12.192 m) vegetateion height in areas considered forested by the 2001 National Land Cover Dataset

Figure 2
December 2015

Turbine locations, pads, access roads, transmission line ROWs, and collector line ROWs reflect November 6, 2015 layout.

KEY

- ① Proposed Wind Turbine
- 1 Sensitive Resource
- Earl Cardot Eastside Overland Trail
- Equestrian Trail
- Snowmobile Trail
- County Boundary
- Municipal Boundary
- Cattaraugus Indian Reservation
- Water Body
- State Forest
- Wildlife Management Area

Number of Visible Turbines

- 1 - 5
- 6 - 10
- 11 - 15
- 16 - 20
- 21 - 25
- 26 - 36

PROJECT # 2015 - 15039.10

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New York City > Saratoga Springs > Syracuse

FAA NAVIGATION LIGHT VEGETATED VIEWSHED*

Ball Hill Wind Project

*Assumes 40 foot (12.192 m) vegetateion height in areas considered forested by the 2001 National Land Cover Dataset

Figure 3

December 2015

Turbine locations, pads, access roads, transmission line ROWs, and collector line ROWs reflect November 6, 2015 layout.

KEY

- Proposed Wind Turbine
- Proposed Wind Turbine with FAA Navigation Light
- Sensitive Resource
- Earl Cardot Eastside Overland Trail
- Equestrian Trail
- Snowmobile Trail
- County Boundary
- Municipal Boundary
- Cattaraugus Indian Reservation
- Water Body
- State Forest
- Wildlife Management Area

Number of Turbines Visible

- 1 - 5
- 6 - 10
- 11 - 15
- 16 - 20
- 21 - 22

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3.2 Inventory of Visually Sensitive Resources

3.2.1 Inventory Criteria

Because it is not practical to evaluate every conceivable location where the proposed Project might be visible, it is accepted visual assessment practice to limit detailed evaluation of aesthetic impact to locations generally considered by society, through regulatory designation or policy, to be of cultural and/or aesthetic importance. In rural areas where few resources of statewide significance are likely to be found, it is common practice to expand inventory criteria to include places of local sensitivity or high intensity of use.

Resources of Statewide Significance – The DEC Visual Policy requires that all aesthetic resources of statewide significance be identified along with any potential adverse effects on those resources resulting from the proposed Project. Aesthetic resources of statewide significance may be derived from one or more of the following categories:

- A property on or eligible for inclusion in the National or State Register of Historic Places [16 U.S.C. § 470a et seq., Parks, Recreation, and Historic Preservation Law Section 14.07];
- State Parks [Parks, Recreation, and Historic Preservation Law Section 3.09];
- Urban Cultural Parks [Parks, Recreation, and Historic Preservation Law Section 35.15];
- The State Forest Preserve [NYS Constitution Article XIV], Adirondack and Catskill Parks;
- National Wildlife Refuges [16 U.S.C. 668dd], State Game Refuges, and State Wildlife Management Areas [ECL 11-2105];
- National Natural Landmarks [36 CFR Part 62];
- The National Park System, Recreation Areas, Seashores, and Forests [16 U.S.C. 1c];
- Rivers designated as National or State Wild, Scenic, or Recreational [16 U.S.C. Chapter 28, ECL 15-2701 et seq.];
- A site, area, lake, reservoir, or highway designated or eligible for designation as scenic [ECL Article 49 or NYDOT equivalent and Adirondack Park Agency], designated State Highway Roadside;
- Scenic Areas of Statewide Significance [of Article 42 of Executive Law];
- A State or federally designated trail, or one proposed for designation [16 U.S.C. Chapter 27 or equivalent];
- Adirondack Park Scenic Vistas [Adirondack Park Land Use and Development Map];
- State Nature and Historic Preserve Areas [Section 4 of Article XIV of the State Constitution];
- Palisades Park [Palisades Interstate Park Commission]; and
- Bond Act Properties purchased under Exceptional Scenic Beauty or Open Space category.

Resources of Local Interest – Places of local sensitivity or high intensity of use (based on local context) were also inventoried, even though they may not meet the broader statewide threshold. Aesthetic resources of local interest were generally derived from the following general categories:

- Recreation areas including playgrounds, athletic fields, boat launches, fishing access, campgrounds, picnic areas, ski centers, and other recreational facilities/attractions;
- Areas devoted to the conservation or the preservation of natural environmental features (e.g., reforestation areas/forest preserves, wildlife management areas, open space preserves);
- A bicycling, hiking, ski touring, or snowmobiling trail designated as such by a governmental agency;
- Architectural structures and sites of traditional importance as designated by a governmental agency;
- Parkways, highways, or scenic overlooks and vistas designated as such by a governmental agency;
- Important urban landscape including visual corridors, monuments, sculptures, landscape plantings, and urban green space;
- Important architectural elements and structures representing community style and neighborhood character;
- An interstate highway or other high volume (relative to local conditions) road of regional importance;
- A passenger railroad or other mass transit route; and
- A residential area greater than 50 contiguous acres and with a density of more than one dwelling unit per acre.

Other Places for Analysis – Given the rural character of much of the study area, the inventory of aesthetic resources has been further expanded to be conservatively over-inclusive. In several cases, locations not rising to the threshold of statewide significance or local interest have been included to represent visibility along sparsely populated rural roadways; most were selected based on field observation of open vistas. Although possibly of interest to local residents, such locations are not considered representative of any aesthetically significant place.

Resources of statewide significance, resources of local interest and other places for analysis were identified though a review of published maps and other paper documents, online research, and windshield survey of publicly accessible locations.

3.2.2 Summary Characteristics of Inventoried Resources

Overall Population and Density of Development – This portion of New York State is quite rural with a very small population. Based on the 2010 census, the population of Town of Villenova is just 1,110 with a population density of just 32 persons per square mile. This compares with a population density of 127 persons per square mile for Chautauqua County and 411 persons per square mile for New York State as a whole. The population of the Town of Hanover is 7,127 including 697 residing in the Village of Westfield. The population density of the Town (excluding the Village) is 149 persons per square mile. Table 3 summarizes these demographics for other municipalities within the study area.

Table 3 Demographic Summary of Study Area Municipalities *

Municipality	Year Round Population	Population Density[5]	Total Housing Units
New York State	*19,378,102*	*411*	
Cattaraugus County	80,317	*61*	*41,111*
Town of Perrysburg	1,626	62	736
Village of Perrysburg	401	406	152
Town of Sheridan	*2,673*	72	1,169
Town of Dayton	1,886	54	836
Village of South Dayton	620	616	271
Town of Leon	1,365	38	485
Chautauqua County	*134,905*	*127*	*66,920*
Town of Villenova	1,110	32	531
Town of Cherry Creek	1,118	31	586
Town of Charlotte	1,729	47	802
Town of Hanover	7,127	149	3,529
Village of Forestville	697	713	315
Town of Arkwright	1,061	31	539

Highway Corridors – Due predominately to the sparse population of the study area, many of the roadways are relatively lightly traveled with a few exceptions (e.g. NYS Thruway I-90). The primary roadways within the study area are NYS Route 39, NYS Route 83, CR85, CR87, CR93, CR322, and NYS Thruway (I-90).

NYS Route 39 is a west-east route that enters the study area west of Forestville and exits the study area in the Village of Perrysburg. According to the NYS DOT, with the exception of the CR 141/Pearl Street to US Route 20 section that sees an AADT of 3,233, approximately 2,000 cars per day travel NYS Route 39 through the study area.

NYS Route 83 crosses the study area from west to east, entering from the Town of Arkwright and turning south upon its intersection with CR 322 and exiting the study area from the Town of Cherry Creek. Approximately 1,800 cars per day travel NYS Route 83 through the study area.

The NYS Thruway (I-90) receives more traffic than any other road within the study area. Roughly two (2) miles of I-90 cross through the study area within the Town of Sheridan. Approximately 24,285 vehicles travel on this stretch of road each day.

Table 4 summarizes the average annual daily traffic (AADT) for state highways within the study area. In addition to a number of NYS Routes and I-90, numerous county and local roads traverse the study area. Generally, these roads are lightly traveled.

[5] Population density is calculated by residents per square mile and is rounded to the nearest whole number.

Table 4 Annual Average Daily Traffic Volumes for Study Area Highways [6]

Route	Section	AADT
NYS Route 39	Cattaraugus County Line to CR 141/Pearl Street	1,914
NYS Route 39	CR 141/Pearl Street to US Route 20	3,233
NYS Route 39	Cattaraugus County Line to North Road	1,840
NYS Route 83	Between CR70/Southside Ave East and NYS Route 322	1,778
NYS Route 83	NYS Route 322 and CR312/Cassadaga Road	1,445
NYS Route 83	CR 312/Cassadaga Road and CR307/Creek Road	1,116
NYS Route 83	CR 307 Creek Road and NYS Route 60 Laona (end NYS Route 83)	1,509
NYS Route 322	CR83 to Cattaraugus County Line	1,704
NYS Route 322	Cattaraugus County Line to CR2/Main Street	2,005
NYS Route 322	CR2/Main Street to US Route 62 (end of NYS Route 322)	1,126
CR85	NYS Route 83 to Henry Road	376
CR85	Henry Road to Sheridan Town Line	404
CR85	Sheridan Town Line to Rider Road	596
CR85	Rider Road to Bradigan Street	1,048
CR85	Bradigan Street to NYS Route 39	1,626
CR85	Pear Street to Forrestville Village Line	1,007
CR85	Forrestville Village Line to CR84/King Road	636
CR85	CR84/King Road to CR86/Stebbins Road	690
CR85	CR29/CR68 to Plank Road (0.17 miles south)	480
CR85	Plank Road to Cherry Creek	497
CR85	Cherry Creek to Cassadaga Road	506
CR85	Cassadaga Road to NYS Route 83	485
NYS Thruway (I-90)	Between Exit 59 and Exit 58	24,285

Park, Recreation and Open Space Resources – Visitors traveling to this area may enjoy numerous outdoor recreational activities including hiking, biking, hunting, and fishing during the warmer months. Cross-country skiing and snowmobile riding are popular during the winter months. Other passive outdoor pursuits, such as bird watching or a leisurely drive through the county's wine country are also common. The Boutwell Hill Management Unit provides various recreational opportunities, as do a number of municipal parks. Some of the more prominent recreational facilities are discussed below.

Approximately seventy percent of the Boutwell Hill Management Unit, which is comprised of the Boutwell Hill State Forest and the Canadaway Creek Wildlife Management Area, are within the study area. The 5,124-acre Unit is a source of numerous types of outdoor activities including hunting, hiking, biking, horseback riding, and snowmobiling. Between Canadaway Creek WMA and Boutwell Hill State Forest, there are 6.2 miles of snowmobile and horse trails in winter and summer respectively. The Unit also includes 8.5 miles of the Earl Cardot Eastside Overland Trail.

- The Boutwell Hill State Forest consists of 2,964 acres of protected forest with numerous multi-use trails, wildlife viewing opportunities, and it serves as a significant resource for deer hunters. In addition to its recreational offerings, the Forest also provides raw materials for New York's timber industry. Roughly half of the Boutwell Hill State Forest is within the study area.
- The Canadaway Creek Wildlife Management Area, just south of the Town of Arkwright and north of the Boutwell Hill State Forest, is home to 2,160 acres of forest and its main purpose is to provide prime habitat for ruffed grouse. In addition to preservation efforts, the forest

[6] http://gis3.dot.ny.gov/html5viewer/ (website last accessed 11/6/15). AADT based on 2013 actual or forecasted numbers.

serves to provide numerous recreational opportunities including hiking, snowmobiling and bicycling. The majority of the Canadaway Creek Wildlife Management Area is within the study area.

The Earl Cardot Eastside Overland Trail offers hiking and biking opportunities to users. The trail is comprised of 19 miles extending from Twenty-Eighth Road in the Town of Gerry at the southernmost end and terminates in the Town of Arkwright to the north. Of the 19 miles, roughly seven and three quarters (7.75) miles are within the study area. This trail is maintained by Chautauqua County's Department of Public Works, Parks Division and County Park Commission.

Snowmobile trails may be found throughout the study area whether on public/private land or along roadways/seasonal roads. Snowmobiling is a popular activity throughout many sections of western New York and is likely enjoyed by large numbers of participants within the study area during the winter months. State snowmobile trails that bisect the area include, but are not limited to C1, C1A, C1B and C4. A number of these trails have significant portions that go through the different parcels of the Boutwell Hill Management Unit. The trails are generally funded by the State, but maintained by local snowmobile groups such as the Cherry Creek Snowmobile Club.

The Chautauqua County Equestrian Trail is a proposed 23.8 mile trail system. Phase 1 of the trail is under development and is located in the southern portion of the study area. The trail starts at the intersection of Ruttenbur and Lewis Roads, along the northern boundary of the Boutwell Hill State Forest. From this location it heads in a southerly direction along the Earl Cardot Eastside Overland Trail and Arab Hill Road which also coincides with an existing snowmobile trail. Ultimately, the portion of the trail that follows Arab Hill Road is anticipated to be relocated west of the current alignment. A future connection (Phase 4) will link Arab Hill Road and the Village of Cherry Creek. This connection appears to be made utilizing existing snowmobile trails. Of the 23.8 miles, roughly eight and three quarters (5.75) miles are within the study area.

Tourism – This section of Chautauqua County draws visitors year-round, as it is ideal for a range of activities including hiking, snowmobiling, cross-country skiing, and sightseeing.

Cultural Resources – The State and National Register of Historic Places do not list any properties (within the study area) in the Towns of Villenova, Hanover, Perrysburg, Dayton, Cherry Creek, Arkwright, and Sheridan. Historically significant properties within the study area are being identified as part of the studies being prepared for the State Historic Preservation Office.

3.2.3 Visibility Evaluation of Inventoried Resources

Each inventoried visual resource was evaluated to determine whether a visual impact might exist. Generally, this consisted of reviewing viewshed maps, aerial photos, and field observations to determine whether or not individual resources would have a view of the Project.

Table 5 lists 56 visual resources located within the five-mile study area and identifies potential Project visibility. The location of these visual resources is referenced by numeric code within Figures 1 and 2.

Of the 56 visual resources inventoried, 12 would likely be screened from the Project by either intervening landform or vegetation and are thus eliminated from further study.

Table 5 Visual Resource Visibility Summary

Key

● *Visibility Indicated*

○ *No Visibility Indicated*

◘ *Filtered view through trees or limited view through structures possible*

Map ID	Receptor Name	Municipality	Inventory Type	Potential Visibility		
				Theoretical View Indicated by Viewshed - Excluding Existing Vegetation (See Figure 1)	Theoretical View Indicated by Viewshed - Including Existing Vegetation (See Figure 2)	Potential View
Recreational and Tourist Resources						
25	Hill Side Acres (Western NY Land Conservancy)	Town of Arkwright	Local Importance	●	○	○
26	Arkwright Hills Campground	Town of Arkwright	Local Importance	○	○	○
35	Woodside Country Campground	Town of Arkwright	Local Importance	○	○	○
36	Boutwell Hill State Forest and Overland Trail	Town of Arkwright	Statewide Significance	●	●	●
38	Canadaway Creek WMA	Town of Arkwright	Statewide Significance	●	●	●
20	American Legion Post 953 Ball Fields	Village of Forestville	Local Importance	●	●	◘
21	Village of Forestville Park	Village of Forestville	Local Importance	●	○	◘
22	Walnut Falls	Village of Forestville	Other Places for Analysis	●	○	◘
7	Tri-County Country Club	Town of Hanover	Local Importance	●	●	●
11	Town of Hanover Park	Town of Hanover	Local Importance	○	○	○
51	Village of South Dayton Park	Village of South Dayton	Local Importance	●	●	◘
56	Chautauqua County Equestrian Trail	Towns of Charlotte and Cherry Creek	Local Importance	●	●	●
Highway Corridors/Roadside Receptors						
28	Center Road	Town of Arkwright	Other Places for Analysis	●	●	●
29	Round Top Road	Town of Villenova	Other Places for Analysis	●	●	●
30	Putnam Road	Town of Arkwright	Other Places for Analysis	●	●	●
32	Farrington Hollow Road	Town of Arkwright	Other Places for Analysis	●	●	●
33	NYS Route 83	Town of Arkwright	Local Importance	●	●	●
8	NYS Route 39	Town of Hanover	Local Importance	●	●	●
9	Hurlbert Road	Town of Hanover	Other Places for Analysis	●	●	●
12	Hanover Road	Town of Hanover	Other Places for Analysis	●	●	●
13	NYS Thruway (I-90)	Town of Hanover	Local Importance	●	●	●

Table 5 Visual Resource Visibility Summary

Key

● *Visibility Indicated*

○ *No Visibility Indicated*

◘ *Filtered view through trees or limited view through structures possible*

Map ID	Receptor Name	Municipality	Inventory Type	Potential Visibility		
				Theoretical View Indicated by Viewshed - Excluding Existing Vegetation (See Figure 1)	Theoretical View Indicated by Viewshed - Including Existing Vegetation (See Figure 2)	Potential View
16	Bennett State Road	Town of Hanover	Other Places for Analysis	●	●	●
17	Bradigan Road	Town of Hanover	Other Places for Analysis	●	●	●
24	Creek Road	Town of Hanover	Other Places for Analysis	●	●	●
55	County Route 93	Town of Hanover	Other Places for Analysis	●	●	●
39	Epolito Road	Town of Sheridan	Other Places for Analysis	●	○	◘
2	Prospect Road	Town of Villenova	Other Places for Analysis	●	●	●
40	County Route 72	Town of Villenova	Other Places for Analysis	●	●	●
41	South Hill Road	Town of Villenova	Other Places for Analysis	●	●	●
43	Pope Hill Road	Town of Villenova	Other Places for Analysis	●	●	●
47	NYS Route 322	Town of Villenova	Other Places for Analysis	●	●	●
48	NYS Route 83	Town of Villenova	Local Importance	●	●	●
54	Flucker Hill Road	Town of Villenova	Other Places for Analysis	●	●	●
Residential/Community Resources						
27	Hamlet of Arkwright	Town of Arkwright	Local Importance	●	○	○
31	Hamlet of Black Corners	Town of Arkwright	Local Importance	●	●	●
34	Hamlet of Griswold	Town of Arkwright	Local Importance	○	○	○
37	Hamlet of Town Corners	Town of Arkwright	Local Importance	●	●	●
49	Pine Valley Central Schools	Town of Cherry Creek	Local Importance	●	●	●
1	Hamlet of Cottage	Town of Dayton	Local Importance	●	●	◘
3	Hamlet of Nashville	Town of Hanover	Local Importance	●	●	●
5	Hamlet of Balltown	Town of Hanover	Local Importance	●	●	◘
6	Hamlet of Parcells Corners	Town of Hanover	Local Importance	●	●	●
10	Hamlet of Smiths Mills	Town of Hanover	Local Importance	●	●	●
14	Hamlet of Dennison Corners	Town of Hanover	Local Importance	●	●	◘
15	Hamlet of Keaches Corners	Town of Hanover	Local Importance	●	○	◘

Table 5 Visual Resource Visibility Summary

Key

● *Visibility Indicated*

○ *No Visibility Indicated*

◘ *Filtered view through trees or limited view through structures possible*

Map ID	Receptor Name	Municipality	Inventory Type	Potential Visibility		
				Theoretical View Indicated by Viewshed - Excluding Existing Vegetation (See Figure 1)	Theoretical View Indicated by Viewshed - Including Existing Vegetation (See Figure 2)	Potential View
4	Hamlet of West Perrysburg	Town of Perrysburg	Local Importance	●	○	○
23	Hawkins Corner	Town of Sheridan	Local Importance	●	●	●
42	Hamlet of Hamlet	Town of Villenova	Local Importance	●	●	●
44	Hamlet of Wrights Corners	Town of Villenova	Local Importance	●	●	●
45	Hamlet of Balcom	Town of Villenova	Local Importance	●	●	●
46	Balcom Corners	Town of Villenova	Local Importance	●	●	●
18	Forestville School Complex	Village of Forestville	Local Importance	●	○	○
19	Village of Forestville	Village of Forestville	Local Importance	●	●	●
50	Village of South Dayton - Downtown	Village of South Dayton	Local Importance	●	●	◘
52	Village of South Dayton - Residential	Village of South Dayton	Local Importance	●	●	●
53	Village of South Dayton/Hamlet of Skunks Corner	Village of South Dayton	Local Importance	●	●	●

3.2.4 Select Resources Beyond Five Miles

Considering the scale of the proposed Project and recognizing the turbines will, at times, be visible at distances greater than five (5) miles, Saratoga Associates completed a vegetated viewshed map to 7.5 miles around the outermost turbines (Appendix A – Figure A1). In addition, supplemental resources were identified outside the five-mile study area during the research completed for the SVRA. Although not all-inclusive, the following resources were identified:

> Hatch Creek State Forest (Towns of Gerry and Ellington; located approximately 9.2 miles from the closest proposed turbine) – Hatch Creek is a 1,280 State Forest with several miles of snowmobile trails and forest roads, which can be utilized as hiking trails, traversing the forest from north to south. Hunting is a popular activity within Hatch Creek.

> Harris Hill State Forest (Towns of Gerry and Ellington; located approximately 9.2 miles from the closest proposed turbine) – The Harris Hill State Forest is 3,554 acres of hardwood and conifer forests make up Harris Hill State Forest. Hiking is a common activity at Harris Hill, and the Earl Cardot Eastside Overland Trail traverses roughly four (4) miles of the forest.

> Zoar Valley Multiple Use Area (Towns of Collins, Persia and Otto; located approximately 9.6 miles from the closest proposed turbine) – Zoar Valley is a 2,540-acre Multiple Use Area consisting of one of New York State's last remaining old growth forests, and a steep canyon. Patron use of the Area is restricted to minimal-impact activities.

> Evangola State Park (Town of Brant; located approximately 10.1 miles from the closest proposed turbine) – Evangola State Park has 733 acres of lakeshore, woodlands, wetlands and an abundance of wildlife, including deer, wild turkey and red-tailed hawks. The park offers facilities for a variety of recreational activities, including picnicking, swimming, camping, tennis, volleyball and baseball. A large beachfront banquet is also available for rental.

> Seaway Trail (located approximately 6.7 miles from the closest proposed turbine) – The New York State Seaway Trail runs for 454 miles along Lake Erie, Lake Ontario, the Niagara River and the St. Lawrence Seaway, and has been recognized by the US Department of Transportation as one of America's Scenic Byway Trails. The Trail coincides with NYS Route 5 through the City of Dunkirk, and passes several historic markers for the War of 1812.

> Lake Erie (located approximately 7.0 miles from the closest proposed turbine to the nearest shoreline point) – The Lake has the fourth largest surface area of the Great Lakes and averages 571 feet above sea level. The Lake and its shoreline are a popular seasonal destination due to its abundant opportunities for water recreation (e.g. boating fishing, swimming), scenic vistas from the shoreline, shoreline parks (including State and local parks), and shopping.

3.3 Factors Affecting Visual Impact

To bring order to the consideration of visual resources, the inventory of visual resources is organized into several recognizable elements, as follows:

3.3.1 Landscape Units

Landscape units are areas with common characteristics of landform, water resources, vegetation, land use, and land use intensity. While a regional landscape may possess diverse features and characteristics, a landscape unit is a relatively homogenous, unified landscape of visual character. Landscape units are established to provide a framework for comparing and prioritizing the differing visual quality and sensitivity of visual resources in the study area. Discrete landscape units were identified through field inventory and air photo interpretation, and divide the study area into zones of unique patterns and visual composition. Within the visual resources study area, four distinctive landscape units were defined. These landscape units, their general landscape character, and use are as follows:

Village Center – The study area contains the Villages of South Dayton and Forestville, and a very small portion of the Village of Perrysburg. These villages are primarily residential and commercial community centers with built structures and tree-lined streets dominating the visual landscape. Each village includes a small downtown area based around a main thoroughfare.

Village Characteristics

Most buildings are one (1) to three (3) stories tall, including brick and wood frame structures. Buildings are a mix of older architectural styles (e.g. predominately Federal and Late Victorian) interspersed with conventional, more modern, mid- to late-20th century residences. Some of the older buildings are very well maintained or restored while others are in various states of disrepair or alteration. Views are generally short distance and focused along streets (which are typically arranged in a grid/block pattern). Structures and trees generally block most distant views, however, filtered or framed views are possible through foreground vegetation and buildings from the perimeter of the villages. Development density drops sharply as one moves away from the central business district as the Village Center landscape unit transitions to the Rural Agricultural Landscape Unit.

Village Characteristics

Views within the Village Center landscape unit may be considered to be of moderate visual quality depending on the character and composition of built and natural features within view.

Rural Hamlet – Rural hamlets are characterized by low to medium density clusters of older residential dwellings and very limited to no retail or commercial services. Buildings are typically one (1) to two (2) stories tall, and include brick commercial blocks and wood frame structures. Buildings styles are an interesting mix of older architectural styles (e.g. Federal, Late Victorian, Italianate) interspersed with more modern, utilitarian styles as well as pre-manufactured homes.

Hamlet Characteristics

A number of rural crossroad hamlets exist within the study area. These areas vary in size but are generally typified by a small group of houses in an otherwise rural area. Residences (a mix of old and new and of varying maintenance) and accessory structures (barns, garages, etc.) are a main feature of rural hamlets. Places of worship, community buildings and general stores are also common.

Roadside residences and street trees often reinforce axial views along the roadway. As a result, views are typically short distance and directed towards the main thoroughfare and adjacent structures. While structures and trees generally block most views, filtered or framed views beyond the hamlet may exist through foreground vegetation. Development density drops almost immediately as one travels away from the hamlet center; transitioning quickly to the character of the surrounding Rural Agricultural Landscape Unit.

The study area includes 16 definitive hamlets. The hamlets of Hamlet, Laona, Cottage, Griswold, Black Corners, and Balcom are representative of this landscape unit.

Views found within the Rural Hamlet landscape unit may be considered to be of moderate visual quality depending on the character and composition of built and natural features within view.

Rural Agricultural – This landscape unit is predominantly a patchwork of open land, including working cropland/pastures and a succession of old-fields transected by property-line hedgerows, occasionally interspersed with woodlots. The terrain itself consists of relatively level topography with gentle low-lying hills and small rounded hillocks primarily under a thousand feet high, but including a few that are up to roughly 1,800 feet. Within this unit, population densities are very low and structures are sparsely located. Uses are predominantly agricultural and very low-density residential. Minor areas of commercial use are occasionally found along the roadside. Building stock consists primarily of permanent homes and manufactured housing, along with accessory structures (barns, garages, sheds, etc.). Structures are of varying vintage and quality. Poorly maintained or dilapidated structures and properties are not uncommon sights.

Characteristics of Agricultural Land

Views within the Rural Agricultural landscape unit are often short distance, contained by foreground vegetation and surrounding mountains. However, distant vistas are common from higher elevations across down-slope agricultural lands. Narrow and curving roads often provide an interesting series of short views of the rural landscape, but also force drivers to direct their attention to the road rather than the adjacent scenery. Some local residents and visitors may regard the aesthetic character of this landscape unit as an attractive and pastoral setting; others may view it as a working landscape, similar in character with much of rural western New York.

Views within the Rural Agricultural landscape unit may be considered of moderate visual quality.

Forest Land – Forest cover dominates large areas of land throughout the study area. In addition to privately owned forested land, the study area contains the Boutwell Hill State Forest and the Canadaway Creek Wildlife Management Area. Vegetation is predominantly mature second growth deciduous woodland with occasional stands of evergreen cover. The State owned property may include paved and unimproved roads and trails that are commonly used for hiking, snowshoeing, nature viewing, snowmobiling, horseback riding, and in some instances may be used for cross-country skiing.[7] Hunting is also permitted on designated sections of State owned property.

Characteristics of Forest Land

Within this landscape unit, dense forest typically prevents distant vistas. However, views beyond the immediate foreground may occur in discrete hillside locations where openings in the forest cover permit. Filtered views through woodland vegetation may also be available during leaf-off seasons.

Views found within the Forest Land landscape unit may be considered to be of moderate to high visual quality depending on the character and composition of built and natural features within view

3.3.2 Viewer/User Groups

Viewers engaged in different activities, while in the same landscape unit, are likely to perceive their surroundings differently. The description of viewer groups is provided to assist in understanding the sensitivity and probable reaction of potential observers to visual change resulting from the proposed Project.

Local Residents – These individuals would view the Project from homes, businesses, and local roads. Except when involved in local travel, such viewers are likely to be stationary and could have frequent and/or prolonged views of the Project. They know the local landscape and may be sensitive to changes in particular views that are important to them. Conversely, the sensitivity of an individual observer to a specific view may be diminished over time due to repeated exposure.

[7] Activities may vary depending on resource.

Local Workers – Local workers are those who work within the study area. It is expected that the workers would generally be indoors and would not experience the surrounding landscape and will therefore not be affected by a change in the surroundings. For the time any workers may be outdoors, sensitivity may vary, however, most workers will primarily be focused on their job responsibilities and give minimal consideration to the surrounding landscape.

Through Travelers – Commuters and through travelers would view the Project from highways. These viewers are typically moving and focusing on the road in front of them. Consequently, their views of the proposed turbines may be peripheral, intermittent, and/or of relatively brief duration. Given a general unfamiliarity or infrequent exposure to the regional or local landscape, travelers are likely to have a lower degree of sensitivity to visual change than would local residents and workers.

Recreational Users and Tourists – This group generally includes all local residents involved in outdoor recreational activities, as well as visitors who come to the area specifically to enjoy the cultural, recreational, scenic resources, and open spaces of the area.

The sensitivity of recreational users to visual quality is variable; but to many, visual quality is an important and integral part of the recreational experience. The presence of wind turbines may diminish the aesthetic experience for those that believe the rural landscape should be preserved for agricultural, rural residential, open space and similar uses. Such viewers will likely have high sensitivity to the visual quality and landscape character, regardless of the frequency of duration of their exposure to the Project. For those with strong utilitarian beliefs, the presence of the turbines will have little aesthetic impact on their recreational experience.

While the scenic quality of the local landscape is an important aspect of the recreational experience for most visitors, viewers will also be cognizant of various foreground details, developments and other visually proximate activities. Visitors and recreational users currently view the existing working landscape, low to moderate-density roadside residential and commercial uses of varying aesthetic quality, as well as utility infrastructure and occasional hilltop communications towers.

A greater number of recreational users will be present in the region when the weather is clear and warm as compared to overcast, rainy or cold days. In addition, more recreational users will be present on weekends and holidays than on weekdays.

It is important to note that Lake Erie, a tourist attraction to the region, is not within the study area. The lakefront provides numerous activities for boating, fishing, sightseeing and shopping.

3.3.3 Distance Zones

Distance affects the apparent size and degree of contrast between an object and its surroundings. Distance can be discussed in terms of distance zones, which was established by the U.S. Forest Service and reiterated by the NYSDEC Visual Policy. A description of each distance zone is provided below to assist in understanding the effect of distance on potential visual impacts.

Foreground (0-½ mile) – At a foreground distance, viewers typically have a very high recognition of detail. Cognitively, in the foreground zone, human scale is an important factor in judging spatial relationships and the relative size of objects. From this distance, the sense of form, line, color and textural contrast with the surrounding landscape is highest. The visual impact is likely to be considered the greatest at a foreground distance.

Middleground (½ mile to 3 miles) – This is the distance where elements begin to visually merge or join. Colors and textures become somewhat muted by distance, but are still identifiable. Visual detail is reduced, although distinct patterns may still be evident. Viewers from middleground distances characteristically recognize surface features such as tree stands, building clusters and small landforms. Scale is perceived in terms of identifiable features of development patterns. From this distance, the contrast of color and texture are identified more in terms of the regional context than by the immediate surroundings.

Background (3-5 miles to horizon) – At this distance, landscape elements lose detail and become less distinct. Atmospheric perspective[8] changes colors to blue-grays, while surface characteristics are lost. Visual emphasis is on the outline or edge of one landmass or water resource against another with a strong skyline element.

3.3.4 Duration/Frequency/Circumstances of View

The analysis of a viewer's experience must include the distinction between stationary and moving observers. The length of time and the circumstances under which a view is encountered is influential in characterizing the importance of a particular view.

Stationary Views – Stationary views are experienced from fixed viewpoints. Fixed viewpoints include residential neighborhoods, recreational facilities, historic resources and other culturally important locations. Characteristically, stationary views offer sufficient time, either from a single observation or repeated exposure, to interpret and understand the physical surroundings. For this reason, stationary viewers have a higher potential for understanding the elements of a view than do moving viewers.

Stationary views can be further divided to consider the effect of short-term and long-term exposure. Sites of long-term exposure include any location where a stationary observer is likely to be visually impacted on a regular basis, such as from a place of residence. Sites of short-term exposure include locations where a stationary observer is only visiting, such as recreational facilities. Although the duration of visual impact remains at the discretion of the individual observer, short-term impacts are less likely to be repeated for a single observer on a regular basis.

Moving Views – Moving views are those experienced in passing, such as from moving vehicles, where the time available for a viewer to cognitively experience a particular view is limited. Such viewers are typically proceeding along a defined path through highly complex stimuli. As the tendency of automobile occupants is to focus down the road, the actual time a viewer is able to focus on individual

[8] Atmospheric Perspective: Even on the clearest of days, the sky is not entirely transparent because of the presence of atmospheric particulate matter. The light scattering effect of these particles causes a reduction in the intensity of colors and the contrast between light and dark as the distance of objects from the observer increases. Contrast depends upon the position of the sun and the reflectance of the object, among other items. The net effect is that objects appear "washed out" over great distances.

elements of the surrounding landscape may be a fraction of the total available view time. Obviously, a driver is most affected by driving requirements.

Conversely, the greater the contrast of an element within the existing landscape, the greater the potential for viewer attention, even if viewed for only a moment by a moving viewer. Billboards along a rural highway, designed to attract attention and recognition, are an example of this condition. Furthermore, an element is more likely to be perceived in greater detail by local residents to whom it is experienced on a daily basis than it is to passers-by.

3.3.5 Summary of Affected Resources

As listed in Table 5, of the original 56 inventoried visual resources, 12 would likely be screened from the proposed Project by either intervening landform or vegetation and are thus eliminated from further study. Table 6 summarizes the factors affecting visual impact (landscape unit, viewer group, distance zone and duration/frequency/circumstances of view) described above for each visual resource determined to have a potential view of the Project.

Table 6 Visual Resource Impact Summary

Map ID	Receptor Name	Municipality	Inventory Type	Factors Affecting Visual Impact: Approximate Number of Turbines Visible (see Figure 2)	Landscape Unit	Viewer/User Group(s)	Distance (miles) /Distance Zone (nearest turbine)[9]	Moving/ Stationary
1	Hamlet of Cottage	Town of Dayton	Local Importance	1	Rural Hamlet	Travelers, Local residents/workers	3.4/Background	Stationary
2	Prospect Road	Town of Villenova	Other Places for Analysis	36	Rural Agricultural	Local residents/workers	0.3/Foreground	Moving
3	Hamlet of Nashville	Town of Hanover	Local Importance	4	Rural Hamlet	Travelers, Local residents/workers	1.7/Middleground	Stationary
4	Hamlet of West Perrysburg	Town of Perrysburg	Local Importance	0	Rural Hamlet	Travelers, Local residents/workers	3.7/Background	Stationary
5	Hamlet of Balltown	Town of Hanover	Local Importance	1	Rural Hamlet	Travelers, Local residents/workers	3.3/Background	Stationary
6	Hamlet of Parcells Corners	Town of Hanover	Local Importance	2	Rural Hamlet	Travelers, Local residents/workers	0.8/Middleground	Stationary
7	Tri-County Country Club	Town of Hanover	Local Importance	10	Rural Agricultural	Recreational	0.6/Foreground	Stationary
8	NYS Route 39	Town of Hanover	Local Importance	36	Rural Agricultural	Travelers, Local residents/workers	0.3/Foreground	Moving
9	Hurlbert Road	Town of Hanover	Other Places for Analysis	17	Rural Agricultural	Local residents/workers	0.4/Foreground	Moving
10	Hamlet of Smiths Mills	Town of Hanover	Local Importance	15	Rural Hamlet	Travelers, Local residents/workers	3.0/Background	Stationary
11	Town of Hanover Park	Town of Hanover	Local Importance	0	Rural Agricultural	Recreational	3.6/Background	Stationary
12	Hanover Road	Town of Hanover	Other Places for Analysis	33	Rural Agricultural	Local residents/workers	0.4/Foreground	Moving
13	NYS Thruway (I-90)	Town of Hanover	Local Importance	33	Rural Agricultural	Travelers, Local residents/workers	4.6/Background	Moving
14	Hamlet of Dennison Corners	Town of Hanover	Local Importance	1	Rural Hamlet	Travelers, Local residents/workers	3.0/Background	Stationary
15	Hamlet of Keaches Corners	Town of Hanover	Local Importance	0	Rural Hamlet	Travelers, Local residents/workers	3.2/Background	Stationary
16	Bennett State Road	Town of Hanover	Other Places for Analysis	32	Rural Agricultural	Local residents/workers	2.6/Middleground	Moving
17	Bradigan Road	Town of Hanover	Other Places for Analysis	12	Rural Agricultural	Local residents/workers	1.5/Middleground	Moving
18	Forestville School Complex	Village of Forestville	Local Importance	0	Village Center	Local residents/workers	2.7/Middleground	Stationary
19	Village of Forestville	Village of Forestville	Local Importance	26	Village Center	Travelers, Local residents/workers	1.9/Middleground	Stationary
20	American Legion Post 953 Ball Fields	Village of Forestville	Local Importance	12	Village Center	Recreational	2.8/Middleground	Stationary
21	Village of Forestville Park	Village of Forestville	Local Importance	0	Village Center	Recreational	3.0/Background	Stationary
22	Walnut Falls	Village of Forestville	Other Places for Analysis	0	Village Center	Recreational	2.8/Middleground	Stationary
23	Hawkins Corner	Town of Sheridan	Local Importance	26	Rural Hamlet	Travelers, Local residents/workers	4.2/Background	Stationary
24	Creek Road	Town of Hanover	Other Places for Analysis	19	Rural Agricultural	Local residents/workers	1.5/Middleground	Moving

[9] Potential visibility of nearest turbine is not considered when determining distance.

Table 6 Visual Resource Impact Summary

Map ID	Receptor Name	Municipality	Inventory Type	Approximate Number of Turbines Visible (see Figure 2)	Factors Affecting Visual Impact: Landscape Unit	Viewer/User Group(s)	Distance (miles) /Distance Zone (nearest turbine)[9]	Moving/ Stationary
25	Hill Side Acres (Western NY Land Conservancy)	Town of Arkwright	Local Importance	0	Rural Agricultural	Recreational	2.0/Middleground	Stationary
26	Arkwright Hills Campground	Town of Arkwright	Local Importance	0	Rural Agricultural	Recreational	4.1/Background	Stationary
27	Hamlet of Arkwright	Town of Arkwright	Local Importance	0	Rural Hamlet	Travelers, Local residents/workers	3.3/Background	Stationary
28	Center Road	Town of Arkwright	Other Places for Analysis	36	Rural Agricultural	Local residents/workers	3.3/Background	Moving
29	Round Top Road	Town of Villenova	Other Places for Analysis	31	Rural Agricultural	Local residents/workers	0.4/Foreground	Moving
30	Putnam Road	Town of Arkwright	Other Places for Analysis	31	Rural Agricultural	Local residents/workers	0.8/Middleground	Moving
31	Hamlet of Black Corners	Town of Arkwright	Local Importance	10	Rural Hamlet	Travelers, Local residents/workers	1.5/Middleground	Stationary
32	Farrington Hollow Road	Town of Arkwright	Other Places for Analysis	32	Rural Agricultural	Local residents/workers	1.5/Middleground	Moving
33	NYS Route 83	Town of Arkwright	Local Importance	36	Rural Agricultural	Travelers, Local residents/workers	0.5/Middleground	Moving
34	Hamlet of Griswold	Town of Arkwright	Local Importance	0	Rural Hamlet	Travelers, Local residents/workers	3.8/Background	Stationary
35	Woodside Country Campground	Town of Arkwright	Local Importance	0	Forest Land	Recreational	4.1/Background	Stationary
36	Boutwell Hill State Forest and Overland Trail	Town of Arkwright	Statewide Significance	36	Forest Land	Recreational	3.3/Background	Stationary
37	Hamlet of Town Corners	Town of Arkwright	Local Importance	29	Rural Hamlet	Travelers, Local residents/workers	2.7/Middleground	Stationary
38	Canadaway Creek WMA	Town of Arkwright	Statewide Significance	36	Forest Land	Recreational	1.9/Middleground	Stationary
39	Epolito Road	Town of Sheridan	Other Places for Analysis	0	Rural Agricultural	Local residents/workers	4.3/Background	Moving
40	County Route 72	Town of Villenova	Other Places for Analysis	35	Rural Agricultural	Local residents/workers	0.7/Middleground	Moving
41	South Hill Road	Town of Villenova	Other Places for Analysis	36	Rural Agricultural	Local residents/workers	0.7/Middleground	Moving
42	Hamlet of Hamlet	Town of Villenova	Local Importance	16	Rural Hamlet	Travelers, Local residents/workers	0.8/Middleground	Stationary
43	Pope Hill Road	Town of Villenova	Other Places for Analysis	36	Rural Agricultural	Local residents/workers	0.3/Foreground	Moving
44	Hamlet of Wrights Corners	Town of Villenova	Local Importance	17	Rural Hamlet	Travelers, Local residents/workers	1.2/Middleground	Stationary
45	Hamlet of Balcom	Town of Villenova	Local Importance	21	Rural Hamlet	Travelers, Local residents/workers	1.8/Middleground	Stationary
46	Balcom Corners	Town of Villenova	Local Importance	23	Rural Hamlet	Travelers, Local residents/workers	1.9/Middleground	Stationary
47	NYS Route 322	Town of Villenova	Local Importance	25	Rural Agricultural	Travelers, Local residents/workers	1.9/Middleground	Moving
48	NYS Route 83	Town of Villenova	Local Importance	29	Rural Agricultural	Travelers, Local residents/workers	0.4/Foreground	Moving
49	Pine Valley Central Schools	Town of Cherry Creek	Local Importance	15	Rural Agricultural	Local residents/workers	3.9/Background	Stationary

Table 6 Visual Resource Impact Summary

Map ID	Receptor Name	Municipality	Inventory Type	Approximate Number of Turbines Visible (see Figure 2)	Factors Affecting Visual Impact: Landscape Unit	Viewer/User Group(s)	Distance (miles) /Distance Zone (nearest turbine)[9]	Moving/ Stationary
50	Village of South Dayton - Downtown	Village of South Dayton	Local Importance	13	Village Center	Travelers, Local residents/workers	3.4/Background	Stationary
51	Village of South Dayton Park	Village of South Dayton	Other Places for Analysis	5	Village Center	Recreational	3.5/Background	Stationary
52	Village of South Dayton - Residential	Village of South Dayton	Local Importance	25	Village Center	Local residents/workers	3.4/Background	Stationary
53	Village of South Dayton/Hamlet of Skunks Corner	Village of South Dayton	Local Importance	23	Village Center	Travelers, Local residents/workers	3.2/Background	Stationary
54	Flucker Hill Road	Town of Villenova	Other Places for Analysis	36	Rural Hamlet	Local residents/workers	1.5/Middleground	Moving
55	County Route 93	Town of Hanover	Other Places for Analysis	36	Rural Hamlet	Local residents/workers	1.5/Middleground	Moving
56	Chautauqua County Equestrian Trail	Towns of Charlotte and Cherry Creek	Local Importance	29	Forest Land[10]	Recreational	3.2/Background	Moving

[10] The trail may traverse different landscape units (e.g. Rural Agricultural), similarly to long linear corridors.

3.4 Degree of Project Visibility

3.4.1 Field Observation and Photography

On November 20, 2015 a field crew obtained photographs from many of the locations that were previously simulated[11] and contained in the original VRA. All photographs were taken to document the existing views from the selected resources using a 12.2-mega pixel digital camera with a lens setting of approximately 50mm[12] to simulate normal human eyesight relative to scale. Photographs were taken at various times of the day in order to illustrate how the turbines would be seen under different lighting conditions (e.g. backlit, etc). In doing so, the photographer made every attempt to minimize the effect of glare within the camera's field of view.

The precise coordinates of each photo location were recorded in the field using a handheld global positioning system (GPS) unit. To determine the direction of the Project from each photo location, the precise coordinates of all proposed turbines were pre-programmed into the GPS as a "waypoint."[13] The GPS waypoint direction indicator (arrow pointing along calculated bearing) was used to determine the appropriate bearing for the camera, so that a desired turbine, group of turbines, or Project would be generally centered in the field of view of each photograph.

3.4.2 Photo Simulations

Selection of Key Receptors for Photo Simulation – To illustrate how the turbines will appear within the study area from a variety of distances and locations, 14 representative photo simulations were prepared. These 14 locations are the same as those simulated in the original VRA and were initially chosen for their relevance to the factors affecting visual impact (viewer/user groups, landscape units, distance zones, and duration/frequency and circumstances of view discussed above).

Table 7 Key Receptors Selected for Photo Simulation

Map ID	Receptor Name	Municipality
2	Prospect Road	Town of Villenova
7	Tri-County Country Club	Town of Hanover
8	NYS Route 39	Town of Hanover
13	NYS Thruway (I-90)	Town of Hanover
33	NYS Route 83	Town of Arkwright
36	Boutwell Hill State Forest and Overland Trail	Town of Arkwright
38	Canadaway Creek WMA	Town of Arkwright
42	Hamlet of Hamlet	Town of Villenova
47	NYS Route 322	Town of Villenova
48	NYS Route 83	Town of Villenova
49	Pine Valley Central Schools	Town of Cherry Creek
53	Village of South Dayton/Hamlet of Skunks Corner	Village of South Dayton
54	Flucker Hill Road	Town of Villenova
55	County Route 93	Town of Hanover

Although the original VRA was submitted in 2008, the study area has seen little development (e.g. commercial, residential, etc.). As such, the photo or series of photos that were deemed most appropriate to illustrate the existing conditions was used for each simulated location. This also provided an opportunity to illustrate the Project over multiple seasons.

The locations of simulated views are presented in Appendix A.

[11] Photographs for simulated locations contained within the original VRA were obtained on April 30, 2008 or July 17, 2008.

[12] A Canon digital SLR with a 24-85 millimeter (mm) zoom lens was used for all Project photography. This digital camera, similar to most digital SLR cameras, has a sensor that is approximately 1.6 times smaller than a comparable full frame 35mm film camera. Recognizing this differential, the zoom lens used was set to approximately 31mm to achieve a field-of-view comparable to a 50mm lens on a full frame 35mm camera (31mm x 1.6 = 50mm).

Photo Simulation Methodology – A photo simulation of the Project was prepared from each key receptor location. Photo simulations were developed by superimposing a rendering of a three-dimensional computer model of the Project into the base photograph taken from each corresponding visual resource (see section 3.4.1). The three-dimensional computer model was developed in *Autodesk Civil 3D® and 3D Studio Max Design®* software (3D Studio Max).

Simulated perspectives (camera views) were then matched to the corresponding base photograph for each simulated view by replicating the precise coordinates of the field camera position (as recorded by GPS) and the focal length of the camera lens used (50mm). Precisely matching these parameters assures scale accuracy between the base photograph and the subsequent simulated view. The cameras elevation (Z) value is derived from Digital Elevation Model (DEM) data plus the cameras height above ground level. The camera's target position was set to match the bearing of the corresponding existing condition photograph. With the existing conditions photograph displayed as a "viewport background," and the viewport properties set to match the photograph pixel dimensions, minor camera adjustments were made (horizontal and vertical positioning, and camera roll) to align the horizon in the background photograph with the corresponding features of the 3D model.

The appearance of the turbines is based on the specifications of the turbine with a hub height of 308 feet (94 meters) and a rotor diameter of 380 feet (116 meters).[14] The turbine model was constructed so that the apex of the blade is 498 feet above ground elevation.

To verify the camera alignment, visible elements (e.g. structures, towers, roads) within the photograph are identified and digitized from digital orthophotos. Each element is assigned a Z value (elevation) based on DEM data and then imported to 3D Studio Max. A 3D terrain model is also created (using DEM data) to replicate the existing site topography. The digitized elements are then aligned with corresponding elements in the photograph by adjusting the camera target.

Once the camera alignment is verified, a to-scale 3D model of the Project is merged into the model space. The 3D model of the Project is intended to accurately convey the current design intent. To the extent practicable, and to the extent necessary to reveal impacts, design details of the proposed turbines were built into the 3D model and incorporated into the photo simulation. Consequently, the scale, alignment, elevations and location of the visible elements of the proposed facilities are true to the conceptual design.

With the model in place, a daylight system is created based on the date and time of the photograph. Regional inputs such as time zone and location are also applied to the daylight system. To accurately depict "reflected light" a ground plane utilizing the previously created mesh (based on DEM data) is placed in the scene. This ground plane also portrays any additional shadows cast by the proposed Project. The camera view is then rendered and saved.

The rendered view was then opened using *Adobe Photoshop* software for post-production editing (i.e., airbrush out portion of turbines that fall below foreground topography and vegetation).

[14] Blades will be 190 feet long.

Arms Length Rule – The photo simulations included in Appendix A have been printed using an 11"x17" page format. At this image size, the page should be held at approximately arms length[15] so that the scene will appear at the correct scale. Viewing the image closer would make the scene appear too large and viewing the image from greater distance would make the scene appear too small compared to what an observer would actually see in the field.

For viewing photo simulations at other page sizes (i.e., computer monitor, projected image or other hard copy output) the viewing distance/page width ratio is approximately 1.5/1. For example, if the simulation were viewed on a 42-inch wide poster size enlargement, the correct viewing distance would be approximately 63 inches, or 5 ¼ feet.

Field Viewing – The photo simulations present an accurate depiction of the appearance of proposed turbines suitable for general understanding of the degree and character of Project visibility. However, these images are a two-dimensional representation of a three-dimensional landscape. The human eye is capable of recognizing a greater level of detail than can be illustrated in a two-dimensional image. Agency decision-makers and interested parties may benefit from viewing the photo simulations in the field from any or all of the simulated vantage points. In this manner, observers can directly compare the level of detail visible in the base photograph with actual field observed conditions.

3.5 Character of Project Visibility

3.5.1 Compatibility with Regional Landscape Patterns

The visual character of a landscape is defined by the patterns, forms and scale relationships created by lines, colors, and textures. Some patterns dominate while others are subordinate. The qualitative impact of a Project is the effect the development has on these patterns, and by corollary on, the visual character of the regional landscape.

Existing Landscape – The visible patterns (form, line, color, and texture) found within the Project area can best be described as representative of the agricultural landscape typical of the region. Given the rural nature of the study area, visible colors are natural, muted shades of green, brown, gray, and other earth tones. When viewed from a distance, the landscape maintains a rather uniform and unbroken blending of colors, which tend to fade with hazing of varying atmospheric conditions.

The following describes the compatibility of the Project with regional landscape patterns within which it is contained and viewed. This evaluation is graphically depicted in the photographic simulations provided in Appendix A.

Form – The form of the regional landscape is essentially a planar landscape. The woodland edge of agricultural fields commonly creates a brief vertical offset of the prevailing planar form. The proposed Project will be comprised of 36 thin, tapered vertical structures distributed throughout the landscape; topped with large rotating blades. The introduction of such clearly man-made and kinetic structures creates a noticeable visual disruption of the agricultural landscape.

[15] Viewing distance is calculated based a 39.6-degree field-of-view for the 50mm camera lens used, and the 15.5" wide image presented in Appendix A. "Arm's length" is assumed to be approximately 22.5 inches from the eye. Arm's length varies for individual viewers.

Access roads associated with the Project will generally be visible to the foreground viewer. These roads will be similar to existing unpaved maintenance roads found frequently throughout the VRA study area.

Line – The existing landscape maintains a horizontal line formed by extended vistas over an agricultural plain that often forms the visible horizon. The well-defined vertical form of 36 turbines that may be visible across this plain introduces a contrasting and distinct perpendicular element into the landscape. Views will commonly include multiple turbines at varying distances from the viewer. It is anticipated that the turbines will most commonly be viewed in an off-axis manner creating the appearance of a rather random arrangement.

Color – Generally, the neutral off-white color of the proposed turbine tower, nacelle, and blades will be viewed against the background sky. Under bright conditions when the turbines are front lit (sun behind viewer) the turbines would be highly compatible with the hue, saturation and brightness of the background sky and distant elements of the natural landscape (see Images 1 and 3[16]). However, when turbines are backlit (sun in front of viewer) the shaded side of the turbine will be darker with increased contrast with the background sky (see Image 2). Increasing the distance between the viewer and turbines, and/or periods of increased atmospheric haze or precipitation will reduce the amount of color contrast.

Image 1 - Side lit

Image 2 - Back lit

Image 3 - Front lit

Turbine Color

Texture – The turbines will consist of a tubular style monopole tower, which provides a simple, visually appealing form. However, turbines have a riged, engineered texture that may contrast existing organic textures.

Scale/Spatial Dominance – The proposed turbines will be the tallest visible elements on the horizon and will be disproportionate to other elements (e.g. silos) commonly visible on the regional landscape. From most foreground and middleground vantage points the contrast of the proposed turbines with commonly recognizable features, such as structures and trees, will result in the proposed Project being perceived as a highly dominant visual element. However, when viewed from background vantage points, perceived scale and spatial dominance of the turbines begins to lessen.

[16] Images 1 - 3 are stock images from Saratoga Associates.

3.5.2 Visual Character during the Construction Period

Construction of the proposed wind turbines will require use of large mobile cranes and other large construction vehicles. Turbine components will be delivered in sections via large semi-trucks. The construction period for each turbine is expected to be quite short. As such, construction related visual impacts will be brief and are not expected to result in adverse prolonged visual impact to area residents or visitors.

3.6 Shadow Flicker Analysis

For the purpose of this analysis, shadow flicker shall be defined as:

> *Rotating blades of wind turbines will result in shadows moving across nearby structures and the surrounding landscape. When the repeating change of light intensity falls across a narrow opening, such as a window, it can cause a flicker effect within the structure (hereafter referred to as "receptors"), as the shadow appears to flick on and off. This effect is known as shadow flicker and only occurs within a structure.* [17]

Shadow flicker will only occur when certain conditions coincide. This would include:

- The turbine blades are rotating during daylight hours (sunrise to sunset), as shadow flicker will not occur at night. Also, shadow flicker will not occur when the turbine is not in operation.
- The sun is low in the sky (e.g. shortly after sunrise or shortly before sunset) so that the shadows are cast.
- Shadow-flicker will not occur on foggy or overcast days when daylight is not sufficiently bright to cast shadows.
- A receptor is within ten rotor diameters of the turbine. Evidence from operational turbines suggests that the intensity of shadow flicker is only an issue at short distances. Beyond ten rotor diameters, a person should not perceive a wind turbine to be chopping through sunlight, but rather as an object with the sun behind it. It is generally accepted that shadow flicker will have a minimal to unperceivable affect on properties at a distance greater than ten turbine rotor diameters[18] from the turbine.
- Turbine shadows can enter a structure only through unshaded windows that face the turbine.

Shadow flicker is a quantitative analysis identifying its potential effect within structures, however it should be noted that shadows outside of the structure might also be apparent. Shadow flicker may occur when light passes through vegetation or other structures, but mostly the shadow would be perceived as it moves across the landscape. These shadows are not considered a nuisance since outdoor ambient lighting is typically higher and the shadows rarely contribute to significant changes in light intensity. As such, outdoor impacts are not further evaluated in this analysis.

[17] *Onshore Wind Energy Planning Conditions Guidance Note – A Report for the Renewables Advisory Board and BERR (October 2007).*
[18] *Planning for Renewable Energy - A Companion Guide to PPS22 Queen's Printer and Controller of Her Majesty's Stationery Office 2004.*

Because of constantly changing solar aspect and azimuth, shadows will be cast on specific days of the year and may pass a stationary receptor relatively quickly. Shadow-flicker will not be an everyday event or be of extended duration when it does occur. Additionally, shadow-flicker is most likely to occur during early morning or late afternoon hours, thus specific receptors may experience shadow-flicker, but the occupants of the receptor may either be inactive or absent. For example, receptors such as residential dwellings located to the west of a turbine, will fall within the shadow zone shortly after sunrise when affected residents are typically asleep with shades drawn. Receptors located to the east of a turbine will fall within the shadow zone shortly before sunset (See Figure 4 for typical shadow pattern). In this case, receptors such as schools or office buildings are likely to be unoccupied during this time.

When the rotor plane is in-line with the sun and receptor (as seen from the receptor), the cast shadows will be very narrow (See Image 1), of low intensity, and will move more quickly past the stationary receptor. When the rotor plane is perpendicular to the sun-receptor "view line," the cast shadow of the blades will move within a larger elliptical area (See Image 2).

Image 1 – Aligned Rotor Plane

Image 2 – Perpendicular Aligned Rotor Plane

The distance between a wind turbine and a receptor directly affects the intensity of the shadows cast by the blades, and therefore the intensity of flickering. Shadows cast close to a turbine (e.g. 250 meters from the turbine) will be more intense, distinct and "focused" compared to the same shadow further away (e.g. 1,000 meters from the turbine). This is because a greater proportion of the sun's disc is intermittently blocked. Similarly, flickering is more intense if created by the area of a blade closer to the rotor and further from the tip. Beyond ten (10) rotor diameters the intensity of the blade shadow is considered negligible and at such a distance there will be virtually no distinct chopping of the sunlight.

3.6.1 Shadow Flicker Methodology

The Projects shadow-flicker analysis was conducted using *WindPRO Basis* software (WindPro) and associated shadow module. This is a widely accepted modeling software package developed specifically for the design and evaluation of wind power projects.

3.6.2 Data Input and Assumptions

Variables and assumptions used in calculating shadow-flicker include:

- Terrain – The terrain within the Project area was developed using a digital elevation model (DEM) obtained through the United States Geological Survey in 1/3 arc second resolution

(approximately 10 meters). This data was interpolated and exported at three-meter interval contours for use in WindPro.

- Latitude and Longitude – WindPro considers the azimuth and altitude of the sun in relation to the proposed turbine. For this analysis, the Project coordinates were specified by using Universal Transverse Mercator coordinate system (UTM) North American Datum (NAD) 83 Zone 18 (reflecting the appropriate zone for this region of New York).
- Turbine Dimensions and Blade Rotation Speed – Each turbine was modeled using the dimensions of a GE 116-2.3. That is, the analysis assumed a hub height of 308 feet (94 meters) and a rotor diameter of 380 feet (116 meters). The frequency of flickering is directly related to the rotor speed and number of blades on the rotor. The shadow flicker analysis assumed a three-bladed wind turbine rotating at 14.9 revolutions per minute (RPM), which is the maximum operating speed of the GE 116-2.3 turbine.
- Sun Coverage – Shadow flicker will occur when more than 20 percent of the sun is blocked by the turbine blade. Less than 20 percent will not result in a noticeable shadow.
- Sun Angle – The angle of the sun over the horizon will be at least three (3) degrees. A lower angle will result in the light passing through atmosphere becoming too diffused to form a coherent shadow.[19]
- Receptor Locations – Locations of structures (referred to as "receptors"), within the Project area, were provided to Saratoga Associates. The location of each receptor is shown in Figures 5 and 6. The shadow flicker analysis was conducted for all receptors located within a 3,806-foot (1,160-meters or 0.72 miles) radius of each proposed turbine. Within this distance 243 residential locations were identified.
- Receptor Windows – It was conservatively assumed that every receptor had windows (one meter by one meter) one meter above ground, in all directions. WindPro refers to this as the "Green house" mode.
- Sunshine probabilities (percentage of time from sunrise to sunset with sunshine) – The WindPro model calculated shadow frequency based on monthly sunshine probabilities. The following sunshine probabilities were used for this analysis and are on historic meteorological data for Buffalo, New York (closest major metropolitan area to the Project).[20]

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
31%	38%	46%	51%	56%	65%	67%	64%	57%	50%	29%	27%

- Operational Time/Rotor Orientation – The WindPro model assumes there will be no shadow flicker during calm winds (when the blades are not turning). Moreover, the orientation of the rotor (e.g., determined by wind direction) affects the size of a shadow cast area. To more accurately calculate the amount of time a shadow will be over a specific location (based on rotor orientation), the WindPro model considers typical wind direction. The following operational time (hours per year [hrs/yr]) of wind direction is based on collected meteorological data provided by Ball Hill Wind Energy, LLC :

[19] WindPro (EMD International A/S).
[20] http://www.ncdc.noaa.gov/ (Data for Buffalo, NY. Website last accessed on 11/15/15.)

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW
491	399	331	246	272	482	1,169	1,032	1,059	1,395	1,179	705

Using these variables, WindPro was used to calculate the theoretical number of hours per year the shadow of a rotor would fall at any given location within the 3,806-foot turbine radius. This calculation includes the cumulative sum of shadow hours for all turbines and is accurate to a 10-meter grid cell resolution. Providing cumulative hours for a receptor does not take into account activities within the dwelling (i.e. rooms of primary use and enjoyment versus less frequently occupied rooms) or account for the direction/location of windows. Figure 5, illustrates the geographic area of cumulative shadow impact using the following increments:

- 0-2 hrs/yr;
- 2-10 hrs/yr;
- 10-20 hrs/yr;
- 20-30 hrs/yr;
- 30-40 hrs/yr; and
- 40+

WindPro does not have the capability to incorporate the possible screening effect of existing vegetation. To account for this condition, a second shadow limit map was prepared excluding areas determined through viewshed analysis to be screened from turbine visibility by existing vegetation. This vegetated condition shadow limits map, although not considered absolutely definitive, identifies the geographic area within which one may expect to have a potential for screening from turbine shadows by intervening forest vegetation. Figure 6, illustrates the geographic area of cumulative shadow impact including the screening effect of existing vegetation.

3.6.3 Shadow Flicker Impact on Existing Structures

There are 243 existing structures located within a 3,806-foot radius of the proposed turbines. These structures were identified through a combination of air-photo interpretation and field verification. Each existing structure was evaluated to determine potential shadow impact. Table 8 summarizes the number of hours per year each inventoried structure would theoretically fall within the shadow zone of one or more proposed turbine. The location of inventoried structures is included in Figure 5 and Figure 6.

Table 8 Shadow Flicker Summary

Map ID*	Maximum Potential Shadow Hours per Year[21]	Does the Receptor Have Visibility of the Project?[22]	Map ID*	Maximum Potential Shadow Hours per Year	Does the Receptor Have Visibility of the Project?
1	13:10	No	44	5:23	Yes
2	9:25	Yes	45	5:03	Yes
3	13:47	No	46	4:49	Yes
4	14:38	Yes	47	4:39	Yes
6	6:08	Yes	48	3:47	Yes
7	1:56	Yes	49	0:00	Yes
8	0:00	Yes	50	0:00	Yes
9	0:00	Yes	51	0:00	Yes
10	0:00	Yes	52	0:00	Yes
11	0:00	No	53	0:00	Yes
12	6:14	No	54	0:00	No
13	4:27	Yes	55	0:00	Yes
14	10:30	Yes	56	0:00	Yes
15	22:47	Yes	57	0:00	Yes
16	9:09	Yes	58	0:00	Yes
17	7:38	No	59	0:00	No
18	6:00	Yes	64	0:00	Yes
19	4:00	Yes	65	0:00	Yes
20	3:20	Yes	66	0:00	Yes
21	3:06	Yes	68	0:00	Yes
22	5:03	Yes	69	0:00	Yes
23	2:42	Yes	70	0:00	Yes
24	0:00	Yes	71	12:18	Yes
25	0:00	Yes	72	13:16	Yes
26	8:15	No	73	21:10	Yes
27	7:19	No	74	15:15	Yes
28	5:17	Yes	75	7:48	Yes
29	0:00	Yes	76	5:51	Yes
30	17:31	Yes	77	6:07	Yes
32	0:00	No	78	6:41	Yes
33	23:39	Yes	95	3:08	Yes
34	10:26	No	96	0:00	Yes
35	10:08	No	97	0:00	Yes
36	5:40	No	98	7:10	Yes
37	5:46	Yes	99	8:01	Yes
38	4:06	No	102	7:08	Yes
43	10:28	Yes	103	10:34	Yes

[21] Hours based on topography only.
[22] Visibility based on topography and vegetation viewshed data used for Figure 2.

Table 8 Shadow Flicker Summary

Map ID*	Maximum Potential Shadow Hours per Year[21]	Does the Receptor Have Visibility of the Project?[22]	Map ID*	Maximum Potential Shadow Hours per Year	Does the Receptor Have Visibility of the Project?
104	8:57	No	149	8:34	Yes
106	9:02	Yes	159	3:57	Yes
110	0:00	No	161	9:36	Yes
111	0:00	Yes	162	11:48	Yes
112	0:00	Yes	163	36:24	Yes
113	0:00	Yes	164	30:14	Yes
114	0:00	Yes	165	26:20	Yes
115	0:00	Yes	166	13:06	Yes
116	2:57	Yes	167	17:29	Yes
117	3:37	Yes	168	17:44	Yes
118	1:34	Yes	169	16:37	No
119	4:51	Yes	170	16:09	No
120	2:20	Yes	171	5:18	No
121	13:53	Yes	172	0:00	No
122	13:25	Yes	173	0:00	Yes
123	19:29	Yes	174	11:15	Yes
124	10:46	Yes	175	8:14	Yes
125	0:00	Yes	176	6:00	Yes
126	9:00	Yes	178	0:00	Yes
127	20:13	Yes	179	0:00	No
128	21:05	Yes	180	0:00	Yes
129	19:20	Yes	181	0:00	Yes
130	12:32	Yes	182	10:22	Yes
131	16:54	Yes	183	6:52	Yes
132	22:35	Yes	184	38:40	Yes
133	21:32	Yes	185	40:51	Yes
134	10:04	Yes	186	24:21	Yes
135	18:09	Yes	187	54:27	Yes
136	34:26	Yes	188	29:25	Yes
137	36:54	Yes	189	27:03	Yes
138	13:36	Yes	190	28:28	Yes
140	4:53	Yes	191	41:44	Yes
141	6:27	No	192	21:55	Yes
142	13:00	Yes	193	21:22	Yes
143	3:27	Yes	194	21:28	Yes
144	15:30	Yes	195	7:16	Yes
145	10:47	Yes	197	6:33	Yes
146	18:01	Yes	198	10:24	Yes
147	29:48	Yes	199	7:28	Yes
148	7:47	No	200	14:10	Yes

Table 8 Shadow Flicker Summary

Map ID*	Maximum Potential Shadow Hours per Year[21]	Does the Receptor Have Visibility of the Project?[22]	Map ID*	Maximum Potential Shadow Hours per Year	Does the Receptor Have Visibility of the Project?
201	19:10	Yes	223	3:56	Yes
202	15:28	Yes	228	2:35	Yes
203	13:20	Yes	229	3:46	Yes
204	14:48	Yes	230	10:13	Yes
205	19:43	Yes	231	9:04	Yes
206	16:04	Yes	232	7:27	No
207	8:27	Yes	234	2:52	Yes
208	4:05	Yes	235	2:53	Yes
209	10:52	Yes	236	8:44	No
210	3:50	Yes	237	7:56	Yes
211	12:46	Yes	238	7:18	Yes
212	20:16	Yes	240	19:47	Yes
213	15:49	Yes	241	9:18	Yes
214	9:45	Yes	242	0:00	Yes
215	8:39	Yes	243	6:05	Yes
216	2:55	No	244	15:00	Yes
217	2:51	Yes	245	0:00	No
218	5:40	Yes	248	0:00	Yes
219	4:45	Yes	249	0:00	Yes
220	0:00	Yes	250	0:00	Yes
222	3:07	Yes			

* The numbering system used for identifying shadow flicker receptors is different from those numbers identifying visual resources.

Based on the expected values (topography only) of the 243 studied receptors located within 3,806-feet of any turbines:

- 54 (22.2%) will theoretically not be impacted;
- 2 (0.8%) will theoretically be impacted 0-2 hrs/yr;
- 82 (33.8%) will theoretically be impacted 2-10 hrs/yr;
- 71 (29.2%) will theoretically be impacted 10-20 hrs/yr;
- 26 (10.7%) will theoretically be impacted 20-30 hrs/yr;
- 5 (2.1%) will theoretically be impacted 30-40 hrs/yr; and
- 3 (1.2%) will theoretically be impacted 40+ hrs/yr.

There are eight (8) receptors that will theoretically be impacted more than 30 hours per year, including:

- Receptor 136 (34:26 hours)
- Receptor 137 (36:54 hours)
- Receptor 184 (38:40 hours)
- Receptor 185 (40:51 hours)

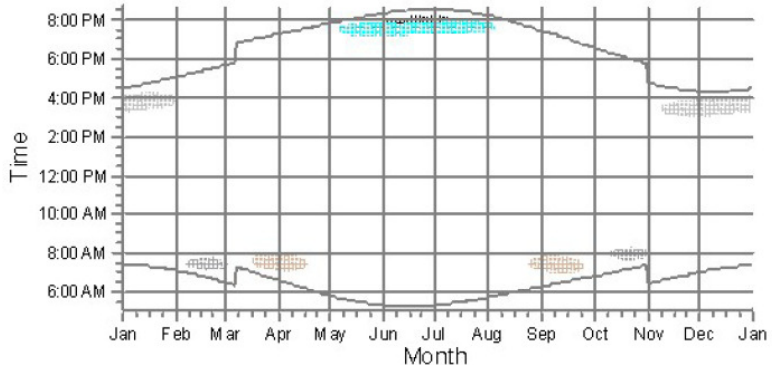
- Receptor 163 (36:24 hours)
- Receptor 164 (30:14 hours)
- Receptor 187 (54:27 hours)
- Receptor 191 (41:44 hours)

Of those receptors that exceed 30 hours all are expected to have views of the Project. In addition, based on the data presented in Table 8, 27 of the 243 receptors will not have visibility of the Project. It is anticipated that those receptors without a view of the Project will not be impacted or will have reduced potential for impact from the shadow caused by the turbines.

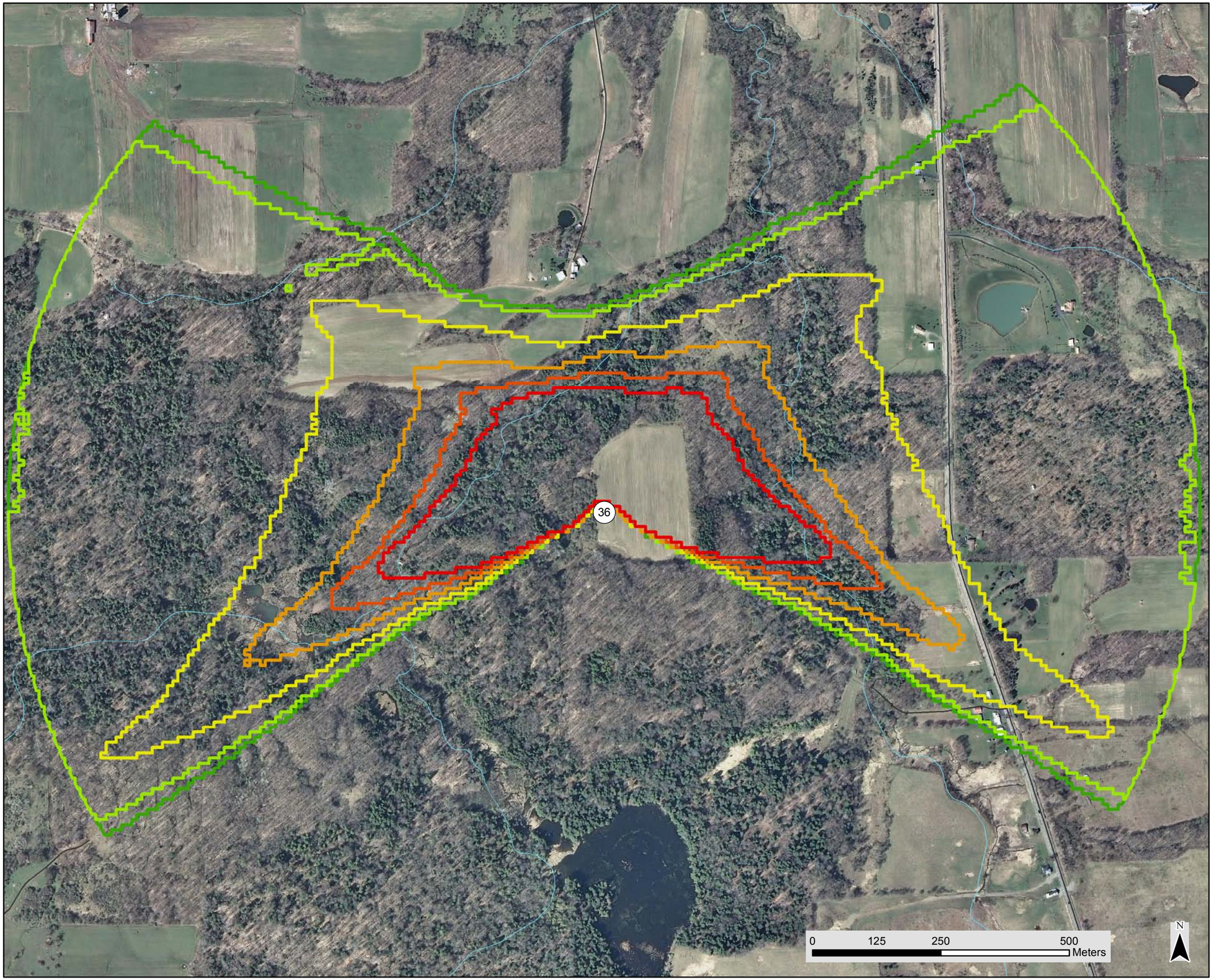
Included below is a graph, generated by WindPro, illustrating the general times of the day and year that shadows are likely at Receptor 187, which has the highest expected duration of shadow flicker. The graph does not include potential adjustments for sunshine probability[23], vegetative screening, or Project operating hours that may occur from year to year. Actual average hours therefore may be less than this graph shows, but the graph is useful because it illustrates when the shadows are physically possible to occur.

Receptor 187 – Shadow flicker is possible at this location during (i) early February through the end of February between 7:15 AM and 8:00 AM and again from early October through the end of October between 7:30 AM and 8:15 AM from turbine 19; (ii) mid March through mid April and again from late August through late September between 7:00 AM and 8:00 AM from turbine 20; (iii) early November through late January between 3:00 PM and 4:15 PM from turbine 13; (iv) early May through early August between 7:00 PM and 8:00 PM from turbine 14; and (v) early June through mid July between 7:45 PM and 8:15 PM from turbine 15.

Potential Time and Duration of Shadow Flicker at Receptor 187



[23] The average amount of sunshine will change yearly.



TYPICAL SHADOW PATTERN FROM TURBINE 36

Ball Hill Wind Project

Figure 4
December 2015

KEY

36 Proposed Wind Turbine

Shadow Hours Per Year

- Less than 2
- 2 - 10
- 10 - 20
- 20 - 30
- 30 - 40
- Greater than 40

PROJECT # 2015 - 15039.10

This map is computer generated using data acquired by Saratoga Associates from various sources and is intended only for reference, conceptual planning and presentation purposes. This map is not intended for and should not be used to establish boundaries, property lines, location of objects or to provide any other information typically needed for construction or any other purpose when engineered plans or land surveys are required.

File Location: B:\2012\12002\Maps\Flicker151109\FlickerTypicalPattern.mxd

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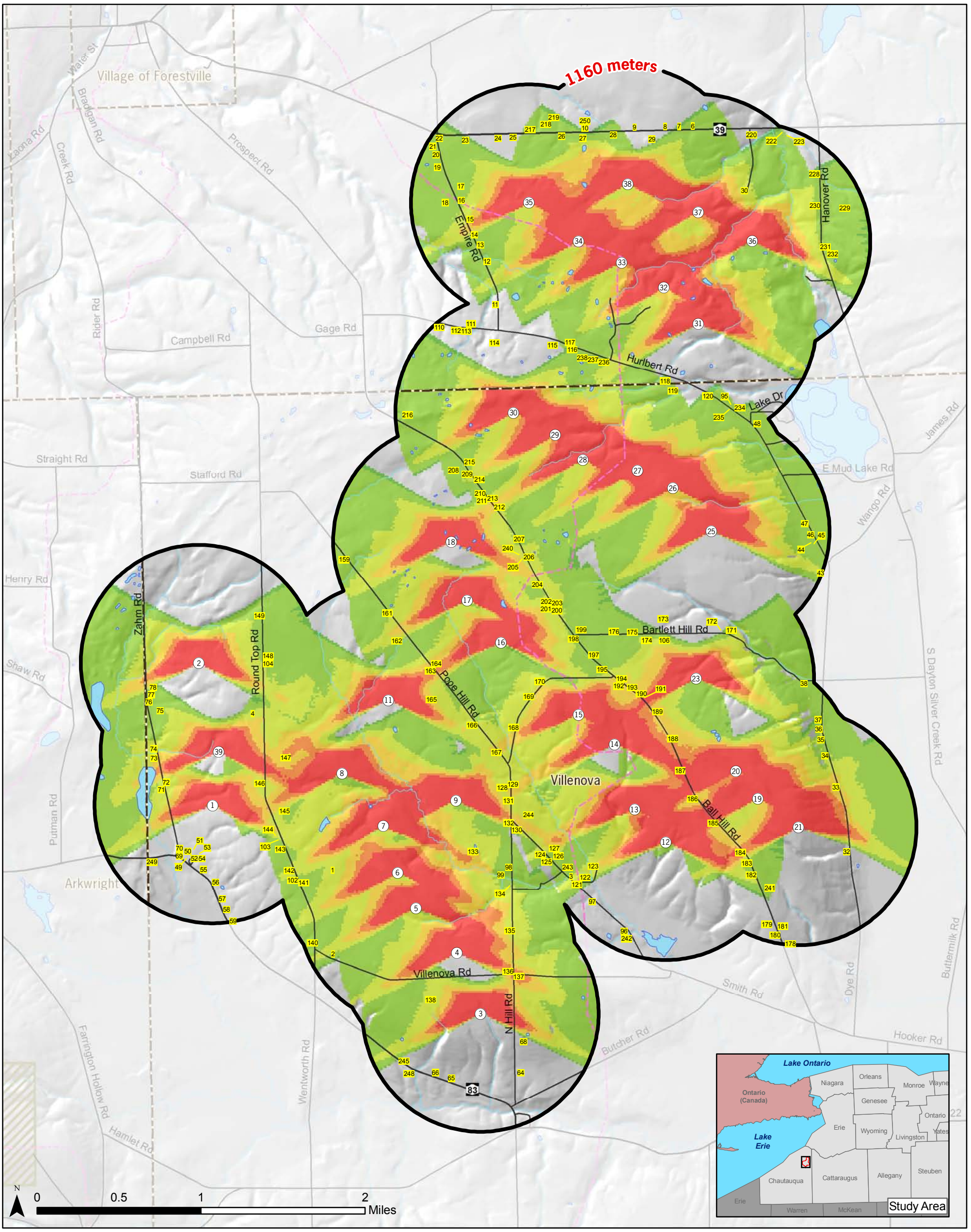

TOPOGRAPHIC SHADOW FLICKER ANALYSIS

Ball Hill Wind Project

Figure 5
December 2015

Turbine locations, pads, access roads, transmission line ROWs, and collector line ROWs reflect November 6, 2015 layout.

KEY

- ① Proposed Wind Turbine
- 248 Shadow Flicker Receptor
- Snowmobile Trail
- Municipal Boundary
- Water Body
- State Forest
- Wildlife Management Area

Shadow Hours Per Year

- Less than 2
- 2 - 10
- 10 - 20
- 20 - 30
- 30 - 40
- Greater than 40

PROJECT # 2015 - 15039.10

This map is computer generated using data acquired by Saratoga Associates from various sources and is intended only for reference, conceptual planning and presentation purposes. This map is not intended for and should not be used to establish boundaries, property lines, location of objects or to provide any other information typically needed for construction or any other purpose when engineered plans or land surveys are required.

File Location:
B:\2012\12002\Maps\Flicker151109\TopoFlicker151109.mxd

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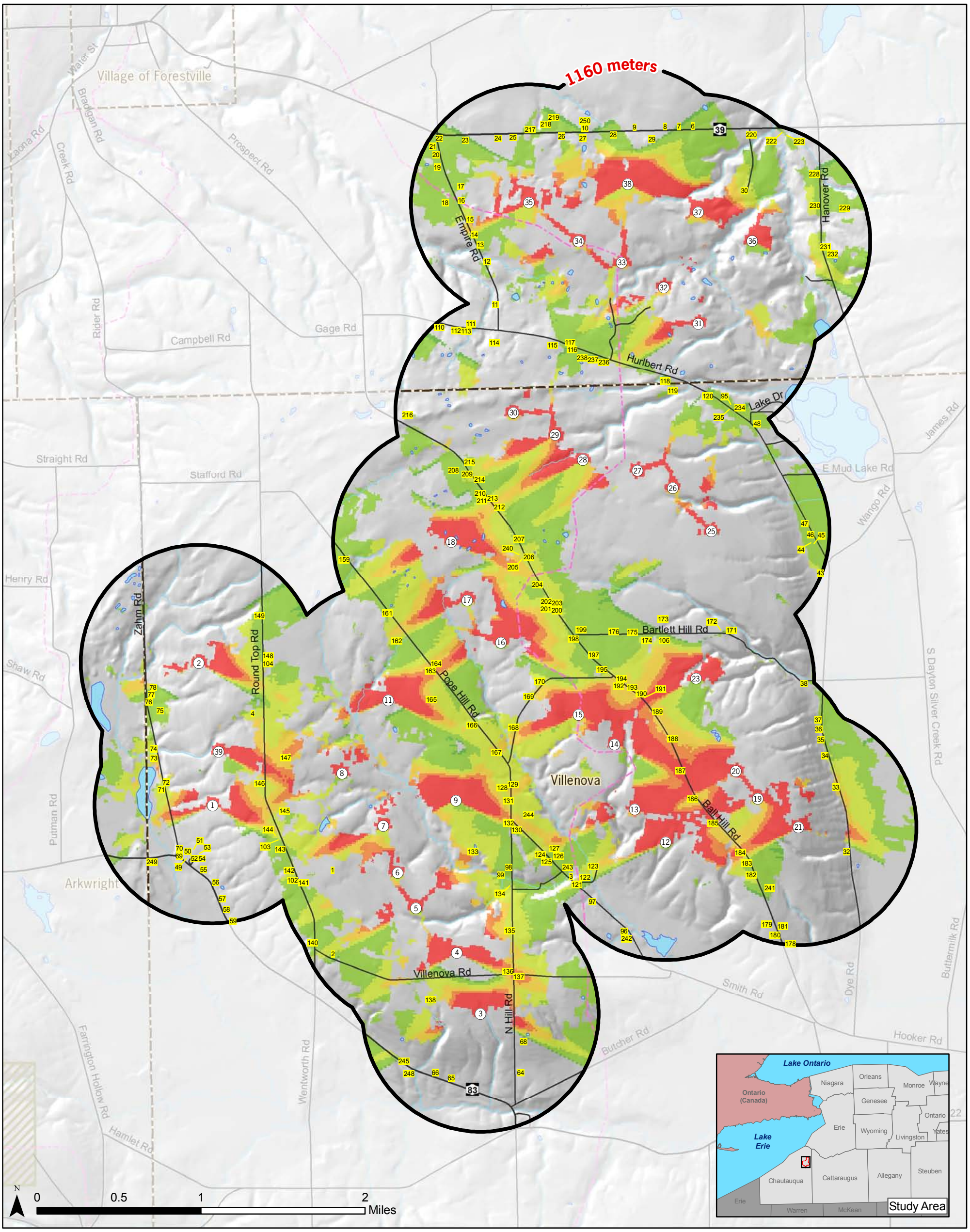

VEGETATED SHADOW FLICKER ANALYSIS*

Ball Hill Wind Project

*Assumes 40 foot (12.192 m) vegetation height in areas considered forested by the 2001 National Land Cover Dataset

Figure 6
December 2015

Turbine locations, pads, access roads, transmission line ROWs, and collector line ROWs reflect November 6, 2015 layout.

KEY

- ① Proposed Wind Turbine
- 248 Shadow Flicker Receptor
- Snowmobile Trail
- Municipal Boundary
- Water Body
- State Forest
- Wildlife Management Area

Shadow Hours Per Year

- Less than 2
- 2 - 10
- 10 - 20
- 20 - 30
- 30 - 40
- Greater than 40

PROJECT # 2015 - 15039.10

This map is computer generated using data acquired by Saratoga Associates from various sources and is intended only for reference, conceptual planning and presentation purposes. This map is not intended for and should not be used to establish boundaries, property lines, location of objects or to provide any other information typically needed for construction or any other purpose when engineered plans or land surveys are required.

File Location:
B:\2012\12002\Maps\Flicker151109\VegFlicker151109.mxd

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3.7 Cumulative Analysis

A cumulative analysis of the Project and the proposed Arkwright Summit Wind Farm and Cassadaga Wind Project was completed as part of this SVRA.

The proposed Arkwright Summit Wind Farm (Arkwright Summit Wind Farm, LLC) is located within the Project's five-mile study area and consists of 38 2.0/2.2 MW turbines that are generally bounded by Straight Road to the north, Livermore Road/Ruttenbur Road to the east, CR 72 to the south, and Miller Road/Park Road to the west.

The proposed Cassadaga Wind Project (EverPower Wind Holdings, Inc.) is partially located within the Projects five-mile study area and consists of up to 62 3.0 MW turbines. The 23 turbines located within the study area are generally bound by Dybkas Road to the north, Dawson Road to the east, West Road to the south, and Rood Road to the west.

The cumulative analysis of these three (3) proposed projects includes a vegetated viewshed map and two (2) simulations.[24]

3.7.1 Cumulative Viewshed

A cumulative viewshed map (Appendix B – Figure B1) was created to show where there was a possibility to see the Project as well as the proposed Arkwright Summit Wind Farm and Cassadaga Wind Project from a specific location within the Projects five-mile study area.

The viewshed map, based on topography and vegetation, follows the same methodology discussed in section 3.1.1, above. The heights used for the cumulative viewshed map are:

- Ball Hill Wind Project (36 turbines) – 498 feet to blade tip (same height in Figures 1 and 2);
- Arkwright Summit Wind Farm (38 turbines including 2 alternative locations) – 492-foot blade tip height; and
- Cassadaga Wind Project (62 turbines) – 540-foot blade tip height.

Within the Projects five-mile study area, the potential visibility of the three (3) wind projects was further quantified to illustrate the number of turbines that may be visible from the previously identified sensitive resources and any given area. This cumulative degree of visibility is summarized on Table 9.

3.7.2 Viewshed Analysis

Based on Table 9 the total cumulative visibility of the proposed wind projects is approximately 40,054 acres. When compared to the viewshed completed for the Ball Hill Wind Project this is an increase of 6,723 acres. Theoretically, as the result of the two (2) adjacent wind projects, one (1) or more turbines would be visible from approximately 39.9% of the entire five-mile Project study area (comprised of 101,462 acres).

[24] Cumulative shadow-flicker analysis is not included.

The introduction of additional turbines within the same viewshed will increase the number of structures visible from many affected vantage points – thus creating a potential higher density of visible turbines. Viewer position is an important factor influencing which of the projects might be visible, or the number of total turbines within view. It is also possible that the adjacent projects may not be visible in a single field of view.

Table 9 Cumulative Viewshed Coverage Summary

	Vegetation and Topography Viewshed (Figure B1 - Cumulative Vegetated Viewshed Analysis)	
	Acres*	**Percent cover**
No Structures Visible	60,958	60.1%
1-5 Structures Visible	4,808	4.7%
6-10 Structures Visible	3,994	3.9%
11-15 Structures Visible	3,950	3.9%
16-20 Structures Visible	2,976	2.9%
21-30 Structures Visible	4,836	4.9%
31-45 Structures Visible	6,229	6.1%
46-60 Structures Visible	5,215	5.1%
61-75 Structures Visible	3,929	3.9%
76-90 Structures Visible	2,714	2.7%
91-110 Structures Visible	1,148	1.1%
111-136 Structures Visible	705	0.7%
Total	101,462	100.0%

* Acreage quantities are rounded to nearest whole number and percentages are rounded to the nearest tenth.

As previously discussed, several factors suggest that actual visibility of the projects from many areas within the study area may be further reduced

3.7.3 Photo Simulations

Selection of Key Receptors for Photo Simulation – The specific location of the two (2) simulation locations was chosen for their relevance to the factors affecting visual impact (e.g. viewer/user groups, landscape units, distance zones and duration/frequency). Table 10 lists the key receptors selected for photo simulation.

Table 10 Key Receptors Selected for Cumulative Photo Simulation

Map ID	Receptor Name	Municipality
33	NYS Route 83	Town of Arkwright
54	Flucker Hill Road	Town of Villenova

All cumulative photo simulations are presented in Appendix B.

3.8 230 kV Transmission Line

The Project will require the construction of an approximately 5.8-mile 230 kV transmission line. The proposed transmission line will include a new substation, switchyard, and 56 new tangent and angle structures (i.e. transmission towers).

Although the route of the transmission line has not been finalized, a proposed route has been reviewed for this SVRA with technical guidance from Ball Hill Wind Energy, LLC. The line will start at a new 175 by 290 foot substation located about 800 feet north of Hurlbert Road, east of Empire Road, in the Town of Hanover. The substation will then tie into a new 230 kV transmission line placed on 90 foot structures.[25] These structures will have an appearance of wood as they will be constructed using wood or metal that will be allowed to oxidize so that they will appear similar to the color of wood. All structures will be located within a permanent 80-foot Right-of-Way[26] (ROW) as it continues in a northerly direction terminating at a switchyard. From the switchyard, the line will be connected to an existing transmission line owned and operated by National Grid (photo to the right) located southeast of the Stebbins and Bennett State Road intersection.

Existing Transmission Line

The basic components of the substation and switchyard generally consist of a main transformer (substation only), a control house, capacitor banks, high voltage bus work, outdoor circuit breakers, relaying equipment, metal clad switchgear, steel support structures, an underground grounding grid, and overhead lightning suppression conductors. It is anticipated that the substation will be similar in characteristic to the built Bliss Windpark substation (photo to the right).

The transmission line will, along certain segments of the new ROW, require vegetation clearing. Although trees along the ROW will be permanently cleared so that they will not interfere with the transmission line once it is operational, the ROW will be allowed to return to a partial vegetative state (low scrub/shrub or agricultural crops).

Substation Example

3.8.1 Transmission Line Viewshed

To calculate the maximum area of potential visibility, one (1) control point was established at the high point for each of the 56 structures located between the proposed substation and switchyard. The resulting viewsheds identify the geographic area within a three-mile radius where some portion of the

[25] Actual structure heights and locations will vary based on final siting/design.
[26] A temporary 12-foot ROW will be used during construction.

proposed transmission line is theoretically visible based on intervening topography and/or existing mature vegetation (Appendix C – Figures C1 and C2).

3.8.2 Viewshed Analysis

Table 11 and Figure C2 illustrates that one (1) or more of the proposed transmission structures will theoretically be visible from approximately 24.9 percent of the three-mile radius, and that approximately 75.1 percent of this area will likely have no visibility of any of the structures when considering the vegetated viewshed. Visibility is most common from properties adjacent or in close proximity to the proposed transmission line, as well as areas to the north, east, and west. Visibility will also be evident from agricultural uplands with cleared lands and down slope vistas in the direction of the proposed transmission line.

Table 11 Transmission Line Viewshed Coverage Summary

	Topography Only Viewshed (Figure C1 – Transmission Line Topographic Viewshed)		**Vegetation and Topography Viewshed** (Figure C2 – Transmission Line Vegetated Viewshed)	
	Acres	**Percentage of Study Area**	**Acres**	**Percentage of Study Area**
No Structures Visible	11,726	29.9%	29,315	75.1%
1-5 Structures Visible	2,369	6.1%	2,459	6.3%
6-10 Structures Visible	2,135	5.5%	1,554	4.0%
11-15 Structures Visible	1,782	4.6%	1,175	3.0%
16-20 Structures Visible	1,633	4.2%	781	2.0%
21-35 Structures Visible	4,516	11.6%	1,575	4.0%
36-50 Structures Visible	5,965	15.3%	1,502	3.8%
51-56 Structures Visible	8,922	22.8%	687	1.8%
Total	39,048	100.0%	39,048	100.0%

*Table 11 and Figure C1 illustrate that one (1) or more structures are theoretically visible from approximately 70.1 percent of the three-mile radius. However, as discussed above, this unrealistic treeless condition analysis is used only to identify the maximum potential geographic area within which further investigation is appropriate. This viewshed is not representative of the anticipated geographic extent of visibility and is not intended for public interpretation. Acreage is rounded to the nearest whole number.

As shown on the vegetated viewshed, there is potential for high visibility along roadways located within the northern half of the 3-mile study area. Open views of the proposed transmission line will be available from many roadways where roadside vegetation is lacking. These roadways include, but are not limited to, the NYS Thruway (I-90), Hanover Road, County Route 89, Bennett State Road, and King Road. Many of these views may be fleeting and short in duration as viewers pass in vehicles. The proposed transmission line will bisect five (5) roadways including, NYS Route 39, with structures located in close proximity and on both sides of the roadways.

Viewers within close proximity to the proposed transmission line will notice that structures will frequently appear and disappear behind intervening foreground landform and vegetation as they move about the study area.

Viewshed mapping also shows that there is a potential for visibility of the structures within the Villages of Forestville and Silver Creek. Based on field investigations, it is anticipated that visibility

would be substantially reduced by the relatively long distance between the village and the proposed transmission line, the generally low/slim profile of the proposed structures, and screening such as structures and localized vegetation,

3.8.3 Photo Simulations

Selection of Key Receptors for Photo Simulation – Two (2) photo simulations were prepared to show how the proposed transmission line would appear in the landscape. The locations were selected within close proximity to the transmission line so that visibility of the slender transmission structures would be the greatest. Table 12 lists the key locations selected for photo simulation.

Table 12 Key Locations Selected for Photo Simulation

Map ID	Receptor Name	Municipality
T1	NYS Route 39	Town of Hanover
T2	King Road	Town of Hanover

The appearance and spacing of the structures is based on information provided by Ball Hill Wind Energy, LLC. All transmission line photo simulations are presented in Appendix C.

4.0 MITIGATION PROGRAM

Professional Design

- Proposed turbines will not be used for commercial advertising, or include conspicuous lettering or corporate logos identifying the Project owner or equipment manufacturer.
- Roads should be designed to generally follow topographic contours to minimize cut and fill and will be located in agricultural lands to the greatest extent possible to minimize vegetative cuts.
- The architectural style of the operations/maintenance structure should be similar to area structures. Concrete block construction and façade should be avoided.
- Fencing around the operations and maintenance building should be limited to only those areas needed for safety.
- Ball Hill Wind Energy, LLC will maximize to the extent possible the subsurface routing of electrical interconnects used to transmit power from between turbine locations.

Screening

- Considering the proposed Project includes 36 wind turbines that will be visible over a wide viewshed area, traditional treatments such as fences, earthen berms and vegetative screening cannot be applied in an effective manner to screen these major structures.
- Visibility of the proposed substation should be screened from the public right-of-way and non-participating landowners utilizing perimeter plantings. A mix of evergreen and deciduous plant materials should be used.
- Building foundation and perimeter plantings should be included in the development plans of the operations/maintenance building. Perimeter plantings should be used to screen service yard and other storage areas the public right-of-way and non-participating landowners. A mix of evergreen and deciduous plant materials should be used.
- Vehicles and areas of the storage yard located at the operations/maintenance building identified for long-term storage should be screened from non-participating parcels and roadways.
- Residences may utilize window shades or strategically placed vegetation in the event shadows cast by the turbines become a nuisance.

Project Siting/Relocation

- The proposed Project is located in the Towns of Villenova and Hanover for the following reasons:
  - Favorable elevation and exposure of the Project area which is well suited for receiving prevailing winds;
  - Reliable winds that meet the necessary criteria for a commercially viable wind energy project; and
  - The relatively low population of the Project area.

By their very nature, modern wind energy projects are large and highly visible facilities. The need to position wind turbines in areas of higher elevation cannot be readily avoided. Given the necessary scale of wind energy turbines and the number of turbines required for a sustainable project, there is no opportunity to substantially relocate the Project or any of its components to other sites in the Towns where it would be significantly less visible.

- Proposed turbines will maintain a minimum setback from residential structures. Such separation of uses assures maximum screening benefit of existing woodland vegetation, where such exists, and minimizes the potential for extended duration shadow flicker on nearby residences.
- Vegetation clearing along the transmission line ROW as well as around the base of the turbines and other project components should be kept to a minimum, however it should not impede operation.

Camouflage/Disguise

- As mandated by the FAA for aviation safety, the color of the blades, nacelle, and tower will be a neutral off-white.
- Utilizing wood or steel poles that oxidize to a brownish color for the transmission structures (not including the substation and switchyard), the color and materials of the structures will be compatible with the surrounding landscape.

Low Profile/Downsizing

- The profile of the wind turbines is dictated by operational efficiency. Because wind turbine power extraction is a function of the cube of wind speed (relatively large increases in power from small increases in wind speed), the height of a tower plays an important role in overall energy production. Reducing the height of the turbines to a meaningful degree would substantially reduce the amount of energy produced rendering the development of the Project impractical or would require constructing a greater number of smaller units to be economically viable.
- The shortest and fewest possible number of transmission poles should be used.

Alternate Technologies

- Wind energy itself is an alternative to traditional energy sources. Meaningful development of renewable wind energy will reduce reliance on fossil fuel combustion and nuclear fission facilities and result in reduction in air pollutants and greenhouse gasses.
- Alternative turbines have been considered (see Section 1.3 of the SDEIS) for this Project. While smaller turbines might be marginally less visible, a greater number would be required to provide the same energy output, resulting in increased visual impacts from higher blade rotation rate and a greater number of turbines within view. Likewise, a fewer number of larger wind turbine generators would require turbines of increased height and/or rotor diameter which would be more prominent in the landscape. Visually, a change in the height or number of turbines may provide a minimal benefit at a particular receptor, but it would do little to change the overall impact of the Project on the regional landscape.

Lighting

- Due to the height of the proposed turbines, the Federal Aviation Administration requires red flashing aviation obstruction lighting be placed atop the nacelle on approximately 22 of the 36 turbines to assure safe flight navigation in the vicinity of the Project. This federally mandated safety feature cannot be omitted or reduced. If appropriate, alternative approved FAA lighting options will be evaluated to determine if they can minimize the visual impact within the study area.
- Lighting for the substation/switchyard should be down firing, motion triggered, and task oriented (e.g. maintenance and emergency). Appropriate light shields should be used to minimize light trespass on neighboring properties or roadways.

Maintenance

- How a landscape and structures in the landscape are maintained has aesthetic implications to the long-term visual character of a project. Ball Hill Wind Energy, LLC places a high priority on facility maintenance, not only for operational purposes, but for aesthetic appearance as well. Recognizing that its public image will be directly linked to the outward appearance of its facilities and desiring to be a welcomed member of the community, Ball Hill Wind Energy, LLC will implement a strict policy of maintenance, including materials and practices that ensure a clean and well-maintained appearance over the full life of the facility.

Decommissioning

- The lifespan of the primary Project components is approximately 20 years. The wind turbines could be repaired indefinitely to extend their useful life. However, it is likely that advancements in technology within this time will make upgrades or replacement of the turbines a more attractive alternative. However, in the unlikely event that the site is to be abandoned, Ball Hill Wind Energy, LLC has developed a draft Decommissioning Plan which is included in the SDEIS as Appendix N. The Decommissioning Plan for the Project includes detailed cost estimates for the removal of Project components to a depth of four feet below grade. This will include the wind turbines, including the tower, nacelle, transformer, electrical components, concrete foundations, and maintenance roads. The Plan also describes the specific steps that will be taken in removing the wind turbines, including the tower, nacelle, transformer, electrical components, transmission lines, concrete foundations, and maintenance roads/rigging pads. Restoration of the areas after removal will include re-vegetation to return the area to as near its present condition as possible.
- When the transmission line, substation, and switchyard structures are no longer necessary, they should be removed. Disturbed areas will become re-established as natural or cultivated vegetation over time.

5.0 SUMMARY AND DISCUSSION OF POTENTIAL VISUAL IMPACT

Visibility Summary

The vegetated viewshed map clearly indicates that one (1) or more of the proposed turbines will be theoretically visible from approximately 32.9 percent of the five-mile radius study area (based on vegetative viewshed). Approximately 67.1 percent of the study area will likely have no visibility of any wind turbines. Visibility is most common in the agricultural uplands from cleared lands with down slope vistas in the direction of turbine groupings.

While viewshed mapping indicates that the Project will be visible within portions of the Village of South Dayton and the Village of Forestville, as well as several hamlets within the study area, field confirmation determined the prevalence of mature street trees and site landscaping combined with one to three story residential and commercial structures. Because of this, views will generally be screened by intervening vegetation and localized structures, although filtered or framed views are likely through foreground vegetation and buildings were found from isolated locations. Direct views are more prevalent on the outskirts of these community centers where localized residential and commercial structures, street trees and site landscaping are less likely to provide a visual barrier.

Open views of the Project will be available from many roadways where roadside vegetation is lacking. These roadways would include, but are not limited to, the NYS Thruway, NYS Routes 39, 83, and 322, County Routes 93 and 87, North and South Hill Road, Pope Hill Road, Farrington Hollow Road, Round Top Road, Aldrich Hill Road, Hanover Road, and Flucker Hill Road. Many of these views may be long distant (background view), fleeting as viewers pass in vehicles, or short in duration.

Views along roadways located in the center of the Project area are likely to include turbines on both sides of the road. Some locations may experience an impacted field of view exceeding 180 degrees. Roadways including Prospect Road (see Figure A3), Hurlbert/Dye Road, Round Top Road, and Pope Hill Road will be impacted by such view extents.

No views, or limited views will occur on the backside of the many hills and within ravines found throughout the five-mile study area. Where topography is oriented toward the turbines, dense forest cover commonly prevents distant views.

The area most directly affected by views of the Project will be where there is a significant amount of cleared or agricultural land within immediate proximity to the Project. Residents and visitors will regularly encounter proximate views of one or more turbines within the foreground and near-middle-ground distances (e.g., ½ to 1 ½ miles). This is also the distance at which the visual contrast of the turbines will be greatest. Within such close proximity, turbines frequently appear and disappear behind intervening foreground landforms and vegetation as viewers move about the Project area.

Impact on Visual Resources

Resources of Statewide Significance – Viewshed analysis, field investigation, and simulations determined that the visual resources of Statewide Significance (Boutwell Hill State Forest and Canadaway Creek WMA) would not be notably affected by the proposed Project. Views from these

resources were field verified from the property boundaries, which the vegetated viewshed analysis indicated having the highest potential for visibility; also it is anticipated that overall visibility would be minimal within the boundaries of the State-owned land due to the vegetative screening witnessed in the field.

In addition, five (5) resources were identified, beyond the five-mile study area, during the completion of the original Visual Resource Assessment. Based solely on results determined through the use of vegetated viewshed data, potential visibility consist of:

- Evangola State Park – Viewshed analysis indicates minimal Project visibility from this receptor.

- Harris Hill State Forest – Viewshed analysis indicates minimal Project visibility from this receptor.

- Zoar Valley Multiple Use Area – Viewshed analysis indicates no Project visibility from this receptor.

- Hatch Creek State Forest – Viewshed analysis indicates no Project visibility from this receptor.

- 5.2 miles of the Seaway Trail (NYS Route 5) falls within 7.5 miles of the Project (Figure A1). 2.3 miles or 44% percent of that length has potential visibility of the Project. Potential visibility is further reduced by screening (vegetation and structures) in developed areas such as the Village of Silver Creek.

The NYSDEC visual Policy states,

> *"Aesthetic impact occurs when there is a detrimental effect on the perceived beauty of a place or structure. Significant aesthetic impacts are those that may cause a diminishment of the public enjoyment and appreciation of an inventoried resource, or one that impairs the character or quality of such a place. Proposed large facilities by themselves should not be a trigger for a declaration of significance. Instead, a project by virtue of its siting in visual proximity to an inventoried resource may lead staff to conclude that there may be a significant impact."*

Based on this definition, it is reasonable to conclude that simple visibility of the proposed wind farm (albeit a large facility) from any of these affected resources of statewide significance does not imply detrimental effect on the perceived beauty of the place or structure; nor will the Project necessarily cause the diminishment of public enjoyment and appreciation of an inventoried resource, or impair the character or quality of such a place.

Resources of Local Interest – Because of the number, scale and distribution of the proposed turbines, some portion of the Project will be visible from places of local interest, that do not necessarily meet the broader statewide threshold for visual significance. Most commonly affected are roadside views along various county and local roadways (for example, see Figures A13 and A15-A16).

Views were found along portions of several county and town roads at varying distance. Most residential neighborhoods and other resources (e.g. playgrounds) located in the villages, hamlets, and throughout the study area where the prevalence of mature street trees and/or site landscaping combined with one (1) and two (2) story structures may substantially limit or screen distant views (for example, see Figures A11 and A13-A14).

In addition to those resources of local interest identified in the VRA, one notable resource, Lake Erie, is located beyond the five-mile study area. Based on field investigation of the shoreline area north of the Village of Silver Creek (within 7.5 miles of the Project), visibility along the shoreline is anticipated to be minimal due to screening caused by vegetation and structures. The potential for Project visibility is anticipated to increase the further the viewer is from the shore. Although a clear line of sight to the Project is a potential, visibility will be further reduced by such factors as distance, atmospheric conditions, and viewer activities.

Character of View

Within the study area typical views, outside developed communities, are characterized by a patchwork of working farms, old fields and forest on a landscape of rolling hills. Built structures consist primarily of low-density permanent homes and manufactured housing, along with accessory structures (barns, garages, sheds, etc.). Development density within the study area is variable, ranging from large, open lots set back from nearby roadways and neighboring properties, to neighborhood clusters of mid-20th century homes or Victorian style homes of varying quality, vintage and size in the more populated villages. Mobile home communities are present within the study area as well. Overall, the structures are of varying vintage and quality.

As shown in the simulations, the introduction of large, clearly man-made structures creates a visible disruption of the landscape. The prominent hills and forests in the study area should be effective sources of minimizing the visual impact of the wind turbines (for example, see Figure A10). This should be true in terms of how visible each turbine will be individually from any given point in the study area and how many turbines can be viewed from any one point in the study area. However, in more level areas, the proposed turbines will be the tallest visible elements within view and will be disproportionate to other elements in the immediate landscape (for example, see Figures A3 and A5). Given the rolling hills in the study area, distribution of turbines across an extended area will result in a minimization of having an overwhelmingly disproportionate amount of turbines visible from any single point (for example, see Figures A4, A10, and A11). The moderately paced sweeping rotation of the turbine blades will heighten the conspicuity of the turbines no matter the degree of visibility.

Affected Viewers

The Towns of Hanover, Villenova, Perrysburg, Sheridan, Dayton, Charlotte, Cherry Creek, Leon, and Arkwright are each quite rural and have small populations. The population of the Town of Villenova is only 1,110 while the population of the Town of Hanover is 7,127. These towns have a population density of 32 and 149 persons per square mile, respectively. This compares with a population density of 127 persons per square mile for Chautauqua County, and 411 persons per square mile for New York State as a whole.

With the exception of a small section of I-90 within the study area, highways are generally lightly traveled. The small stretch of I-90 that goes through the study area has the highest average annual daily traffic (AADT) volume of any roads in the study area (approximately 24,200 vehicles per day). Aside from I-90, the most heavily traveled stretch of road that lies entirely within the study area is a section of NYS Route 39, located between US Route 20 (outside the five-mile study area) and County Route 141. This section of NYS Route 39 receives approximately 3,200 vehicles per day. While the Project will frequently be visible to local residents and travelers, the total number of potentially affected permanent year-round viewers within the study area is relatively small when compared to other regions of New York State.

The impact to those residents and tourists recreating in the study area will vary. The sensitivity of individuals to visual quality is variable; but to many, visual quality is an important and integral part of their outdoor experience. The presence of wind turbines may diminish the aesthetic experience for those that believe that the rural landscape should be preserved for agricultural, rural residential, open space and similar uses. Such viewers will likely have high sensitivity to the visual quality and landscape character, regardless of the frequency of duration of their exposure to the proposed Project.

Viewshed and field analysis determined that the Project would be visible from locations including the Overland Trail, Tri-County Country Club, Boutwell Hill State Forest (perimeter of property) and the Canadaway Creek WMA (perimeter of property). Hunters and snowmobile riders on private lands will most likely view the Project across open agricultural fields and may also have a view of the turbines in close proximity.

Other Project Components

Construction Related Impacts – Construction of the proposed wind turbines will require the use of large mobile cranes and other large construction vehicles. Turbine components will be delivered in sections via large semi-trucks. During construction, multiple laydown areas totaling 26.2 acres will be scattered throughout the Project area. A permanent O&M building, and associated infrastructure, will occupy 2.8 acres along North Hill Road in the Town of Villenova. The O&M building will provide a base of operations for the Project. The construction period for each turbine is expected to be quite short. As such, construction related visual impacts will be brief and are not expected to result in adverse prolonged visual impact to area residents or visitors.

Operations and Maintenance Building – The proposed operations and maintenance building will be located in the Town of Villenova and is a relatively minor component of the Project. The single story operations and maintenance building will be similar scale and architectural character to other large agricultural/industrial buildings in the area.

Access Roadways – Roadways to each turbine will be constructed in order for personnel to perform maintenance. These roadways will be similar in characteristic to farm driveways/roads and the driveways that lead to existing gas wells. These are relatively minor components of the Project and will not be highly visible.

Collection Line – It is anticipated that the interconnection cables (between the turbines) will be buried and will not be considered an impact.

FAA Lighting – While red flashing aviation obstruction lighting on communications towers are commonly visible nighttime elements almost everywhere, the concentration of lights within the turbine area would be somewhat unique. While red flashing aviation obstruction lighting on communications towers is commonly visible nighttime elements almost everywhere, the concentration of lights within the turbine area would be somewhat unique. Up to 22 red lights flashing in unison will be conspicuous and somewhat discordant with the current dark nighttime conditions. Although aviation obstruction lighting is generally directed upward, the relatively low intensity does not result in perceptible atmospheric illumination (sky glow).

A preliminary lighting plan, following FAA regulations, was developed for use in completing a viewshed map. The viewshed map clearly indicates that one or more of the 22 proposed lights would theoretically be visible from approximately 28.6 percent of the five-mile study area. The magnitude of this impact will depend on how many lighted turbines are visible at a specific location and existing ambient lighting conditions present within the view. Local residents quietly enjoying the rural nighttime setting will likely be more affected by this condition than would motorists traveling through the area after dark. These are federally mandated safety features and cannot be omitted of reduced. Daytime lighting of the turbines is not required.

Shadow Flicker

Based on Table 8 and Figures 5 and 6, of the 243 studied shadow receptors located within 3,806-feet of the proposed turbines:

- 54 (22.2%) will theoretically not be impacted;
- 2 (0.8%) will theoretically be impacted 0-2 hrs/yr;
- 82 (33.8%) will theoretically be impacted 2-10 hrs/yr;
- 71 (29.2%) will theoretically be impacted 10-20 hrs/yr;
- 26 (10.7%) will theoretically be impacted 20-30 hrs/yr;
- 5 (2.1%) will theoretically be impacted 30-40 hrs/yr; and
- 3 (1.2%) will theoretically be impacted 40+ hrs/yr.

All eight (8) receptors that exceed 30 hours of shadow will theoretically have views of the Project. For these receptors, if they are determined to be not participating in the Project, potential mitigation should be evaluated on a case-by-case basis. Potential mitigation for those ultimately participating in the Project may be included in their lease agreements.

There are no regulations or guidelines that establish an acceptable degree of shadow flicker impact on a potential receptor. Based on the limited number of hours any structure will be impacted, shadow flicker is not expected to create an adverse impact on most nearby residential dwellings. For residences where shadow flicker is greatest, this impact might be considered an annoyance by some, and unnoticed by others.

Cumulative Impact

With the introduction of the proposed Ball Hill Wind Project, as well as the Arkwright Summit Wind Farm and Cassadaga Wind Project, one (1) or more structures will be theoretically visible from approximately 39.9 percent of the Projects five-mile radius study area. The total cumulative visibility of the proposed wind projects is approximately 40,504 acres. When compared to the viewshed completed solely for the Ball Hill Wind Project this is an increase of 6,723 acres. Overall, the cumulative impact appears to be relatively minor as the increased visibility is approximately 6.6% of the total acreage of the study area.

The introduction of additional turbines within the same viewshed will increase the number of structures visible from many affected vantage points – thus creating a potential higher density of visible structures. However, visibility of the projects is dependent on viewer location/orientation, distance, and other factors discussed in the VRA (Section 3.3). It is possible that with the additional turbines, the cumulative impact may be minimal (for example, see Figures B2 and B3). As illustrated in both figures, the additional Arkwright and Cassadaga turbines are visible in the distance, behind the proposed Project, limiting potential impact.

It is also possible that all three (3) projects may not be visible in a single field of view. For example, views of the Ball Hill Wind Project are to the east and north, views of the Arkwright Summit and Cassadaga projects are to the west and south. If a viewer is at a location north of the adjacent projects and is viewing eastward, it is possible that the adjacent projects will not be visible.

230 kV Transmission Line

Visibility is most common from properties adjacent or in close proximity to the proposed transmission line, as well as areas to the north, east, and west. Visibility will also be evident from agricultural uplands with cleared lands and down slope vistas in the direction of the proposed transmission line.

Open views of the proposed transmission line will be available from many roadways where roadside vegetation is lacking. These roadways would include, but are not limited to, the NYS Thruway (I-90), Hanover Road, County Route 89, Bennett State Road, and King Road. Many of these views may be fleeting as viewers pass in vehicles, short in duration, or in the context of other transmission structures. However, the transmission structures will be located in close proximity and on both sides of many roadways noted above (for example, see Figure C3).

Viewers within close proximity to the proposed transmission line will also notice that structures will frequently appear and disappear behind intervening foreground landform and vegetation as they move about the study area. Along some portions of the route, vegetation will need to be cleared (for example, see Figure C4). The clearing will be more noticeable in close proximity and along ridge tops.

Given the potential for limited visibility of the proposed transmission line and the frequency of existing electrical and telephone lines with the study area, the proposed line will not have a significant impact on the visual character of the region. When visible, the factors outlined in Section 3.3

(landscape unit, viewer group, distance zone and duration/frequency/circumstances of view), will have an effect on the structures visibility.

Comparison of the SVRA and Original VRA

Landscape Character/Visual Setting

In comparing the landscape character identified in both the SVRA and original VRA there has been little change within the study area. Some of the more notable differences include changes in roadside vegetation (e.g. vegetation growth or removal), as well as a few newly built structures. Generally, these structures were seen as small buildings (e.g. garage, barn), new utility poles, and an occasional residential structure.

Viewshed Mapping

The potential visibility identified in both the SVRA and original VRA are similar, not only in the number of acres, but geographic area as well. The SVRA evaluated a slightly larger study area (additional 1,440 acres) and had a slight increase in visibility (3.7% acres) when comparing the vegetated viewshed maps. This increase in visibility is most likely the result of a larger study area and taller turbines.

Photographic Simulations

Although the Project contains 14 fewer turbines than the layout presented in the original VRA, overall visibility of both projects are similar. The noticeable changes illustrated in the simulations are likely the result of the Project layout and reduction in the number of turbines. Generally, the increased heights of the turbines do not appear to be significant factor in the completed simulations.

Shadow Flicker Analysis

The potential shadow flicker evaluated in both the SVRA and VRA are similar, but it appears that the proposed Project may have a slightly less impact on structures receiving 30+ hours of shadow flicker per year (3.7% improvement). Although the Project has fewer turbines, it analyzed a larger study area (3,806 feet from a turbine) and more structures (receptors). The Project had notable differences in the following yearly categories:

- 2-10 hrs/yr – SVRA's 33.8% compared to the VRA's 40.1% for a difference of 6.3%;
- 10-20 hrs/yr – SVRA's 29.2% compared to the VRA's 19.1% for a difference of 10.1%; and
- 40+ hrs/yr – SVRA's 1.2% compared to the VRA's 4.5% for a difference of 3.3%.

All other categories had less than a 1% difference.

Transmission Line

Although the SVRA reviewed a potential design for a 230 kV transmission line in comparison to the 115 kV line analyzed in the original VRA, visibility is similar. Both viewsheds were similar in the number of acres analyzed and the geographic area the transmission structures would be visible. The SVRA evaluated a slightly smaller study area (128 acres less) with fewer yet taller structures. The

Project has a slight increase in visibility (3.2% acres) when comparing the vegetated viewshed maps. The increased visibility is most likely the result of the taller transmission structures.

Visual Impact Conclusion

The U.S. Department of Energy and New York State Public Service Commission have mandated that renewable energy sources, such as wind turbines, will provide an increasing percentage of the nation's electricity in the coming years. Meaningful development of renewable wind energy will reduce the reliance on fossil fuel combustion and nuclear fission facilities and result in reduction in air pollutants and greenhouse gasses. This Project is proposed to meet, in small part, this ambitious federal and state objective to provide an environmentally friendly and renewable energy source to help meet the growing energy needs for New York State residents and business.

By their very nature, modern wind energy projects are large and highly visible facilities. The need to position these tall moving structures in highly visible locations cannot be readily avoided. The siting of wind turbines within a rural agricultural area provides increased opportunity for potentially discordant views both near and far. While the use of mitigation techniques will help to minimize adverse visual impact, the construction of the Project will be an undeniable visual presence on the landscape. However, unlike development projects such as housing complexes and commercial centers, the proposed wind energy facility can and will be decommissioned and removed at the end of its useful working life. All of the towers will be removed and the Project area restored as close to its present condition as possible, thus restoring the landscape to its original condition.

Glossary[27]

Aesthetic impact: Aesthetic impact occurs when there is a detrimental effect on the perceived beauty of a place or structure. Mere visibility, even startling visibility of a project proposal, should not be a threshold for decision-making. Instead a project, by virtue of its visibility, must clearly interfere with or reduce the public's enjoyment and/or appreciation of the appearance of an inventoried resource (e.g. cooling tower plume blocks a view from a State Park overlook).

Aesthetically significant place: A formally designated place visited by recreationists and others for the express purpose of enjoying its beauty. For example, millions of people visit Niagara Falls on an annual basis. They come from around the country and even from around the world. By these measurements, one can make the case that Niagara Falls (a designated State Park) is an aesthetic resource of national significance. Similarly, a resource that is visited by large numbers who come from across the state probably has statewide significance. A place visited primarily by people whose place of origin is local generally is generally of local significance. Unvisited places either have no significance or are "no trespass" places.

Aesthetic Quality: There is a difference between the quality of a resource and its significance level. The quality of the resource has to do with its component parts and their arrangement. The arrangement of the component parts is referred to as composition. The quality of the resource and the significance level are generally, though not always, correlated.

Atmospheric perspective: Even on the clearest of days, the sky is not entirely transparent because of the presence of atmospheric particulate matter. The light scattering effect of these particles causes atmospheric or aerial perspective, the second important form of perspective. In this form of perspective there is a reduction in the intensity of colors and the contrast between light and dark as the distance of objects from the observer increases. Contrast depends upon the position of the sun and the reflectance of the object, among other items. The net effect is that objects appear "washed out" over great distances.

Scientific Perspective: Scientific, linear, or size perspective is the reduction in the apparent size of objects as the distance from the observer increases. An object appears smaller and smaller as an observer moves further and further from it. At some distance, depending upon the size and degree of contrast between the object and its surroundings, the object may not be a point of interest for most people. At this hypothetical distance it can be argued that the object has little impact on the composition of the landscape of which it is a tiny part. Eventually, at even greater distances, the human eye is incapable of seeing the object at all.

Viewshed: A map that shows the geographic area from which a proposed action may be seen is a viewshed.

Visual Assessments: Analytical techniques that employ viewsheds, and/or line-of-sight profiles, and descriptions of aesthetic resources, to determine the impact of development upon aesthetic resources; and potential mitigation strategies to avoid, eliminate or reduce impacts on those resources.

Visual impact: Visual impact occurs when the mitigating effects of perspective do not reduce the visibility of an object to insignificant levels. Beauty plays no role in this concept. A visual impact may also be considered in the context of contrast. For instance, all other things being equal, a blue object seen against an orange background has greater visual impact than a blue object seen against the same colored blue background. Again, beauty plays no role in this concept.

[27] NYSDEC Visual Policy (2000) pp. 9-11.

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Appendix A

Viewsheds and Photographic Simulations

7.5 - MILE VEGETATED VIEWSHED*

Ball Hill Wind Project

*Assumes 40 foot (12.192 m) vegetation height in areas considered forested by the 2001 National Land Cover Dataset

Figure A1
December 2015

Turbine locations, pads, access roads, transmission line ROWs, and collector line ROWs reflect November 6, 2015 layout.

KEY

- Proposed Wind Turbine
- Sensitive Resource
- Earl Cardot Eastside Overland Trail
- Equestrian Trail
- Snowmobile Trail
- County Boundary
- Municipal Boundary
- Cattaraugus Indian Reservation
- Water Body
- State Forest
- Wildlife Management Area

Number of Turbines Visible

- 1 - 5
- 6 - 10
- 11 - 15
- 16 - 20
- 21 - 25
- 26 - 36

This map is computer generated using data acquired by Saratoga Associates from various sources and is intended only for reference, conceptual planning and presentation purposes. This map is not intended for and should not be used to establish boundaries, property lines, location of objects or to provide any other information typically needed for construction or any other purpose when engineered plans or land surveys are required.

File Location:
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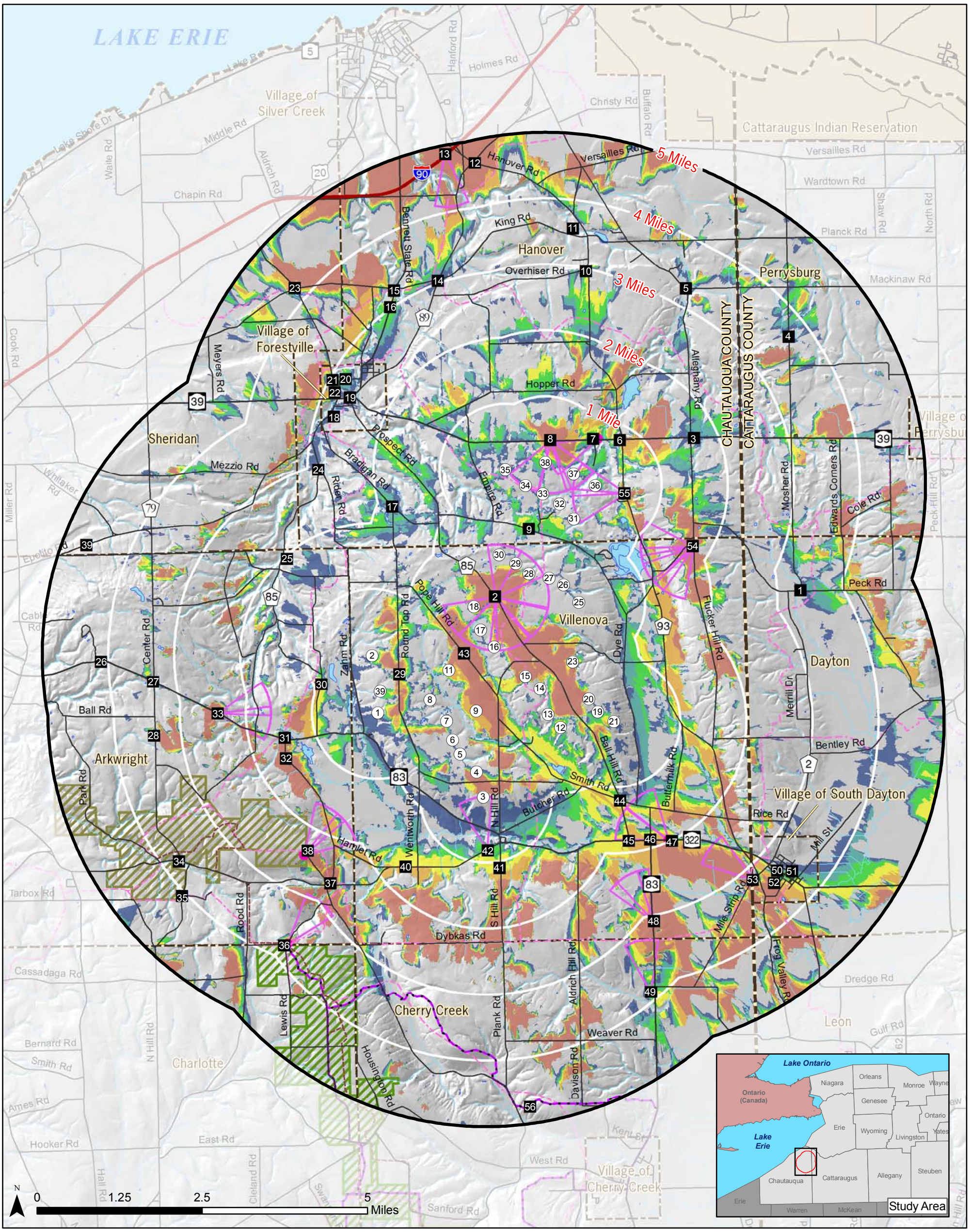

VEGETATED VIEWSHED* AND PHOTO LOCATIONS

Ball Hill Wind Project

*Assumes 40 foot (12.192 m) vegetateion height in areas considered forested by the 2001 National Land Cover Dataset

Figure A2
December 2015

Turbine locations, pads, access roads, transmission line ROWs, and collector line ROWs reflect November 6, 2015 layout.

KEY

- ① Proposed Wind Turbine
- 1 Sensitive Resource
- Earl Cardot Eastside Overland Trail
- Equestrian Trail
- Snowmobile Trail
- County Boundary
- Municipal Boundary
- Cattaraugus Indian Reservation
- Water Body
- State Forest
- Wildlife Management Area

Number of Visible Turbines

- 1 - 5
- 6 - 10
- 11 - 15
- 16 - 20
- 21 - 25
- 26 - 36

Approximate Photo Angle

PROJECT # 2015 - 15039.10

This map is computer generated using data acquired by Saratoga Associates from various sources and is intended only for reference, conceptual planning and presentation purposes. This map is not intended for and should not be used to establish boundaries, property lines, location of objects or to provide any other information typically needed for construction or any other purpose when engineered plans or land surveys are required.

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New York City > Saratoga Springs > Syracuse

Photo taken during 2008.

Existing Condition

FIGURE A3-a

Photo Simulation

VP#2 - Prospect Road (looking northeast to southeast)

Town of Villenova

Proposed Condition

FIGURE A3-b

Photo Simulation

VP#2 - Prospect Road (looking northeast to southeast)

Town of Villenova

Photo taken during 2008.

Existing Condition

FIGURE A3-c

Photo Simulation

VP#2 - Prospect Road (looking northeast to southeast)

Town of Villenova

Proposed Condition

FIGURE A3-d

Photo Simulation

VP#2 - Prospect Road (looking northeast to southeast)

Town of Villenova

Photo taken during 2008.

Existing Condition

FIGURE A3-e

Photo Simulation

VP#2 - Prospect Road (looking northeast to southeast)

Town of Villenova

Proposed Condition

FIGURE A3-f

Photo Simulation

VP#2 - Prospect Road (looking northeast to southeast)

Town of Villenova

Photo taken during 2008.

Existing Condition

FIGURE A3-g

Photo Simulation

VP#2 - Prospect Road (looking northeast to southeast)

Town of Villenova

Proposed Condition

FIGURE A3-h

Photo Simulation

VP#2 - Prospect Road (looking northeast to southeast)

Town of Villenova

Existing Condition

Proposed Condition

FIGURE A3-i

Photo Simulation

VP#2 - Prospect Road (looking northeast to southeast)

Town of Villenova

Photo taken during 2008.

Existing Condition

FIGURE A3-j

Photo Simulation

VP#2 - Prospect Road (looking southeast to west)

Town of Villenova

Proposed Condition

FIGURE A3-k

Photo Simulation

VP#2 - Prospect Road (looking southeast to west)

Town of Villenova

Photo taken during 2008.

Existing Condition

FIGURE A3-I

Photo Simulation

VP#2 - Prospect Road (looking southeast to west)

Town of Villenova

Proposed Condition

FIGURE A3-m

Photo Simulation

VP#2 - Prospect Road (looking southeast to west)

Town of Villenova

Photo taken during 2008.

Existing Condition

FIGURE A3-n

Photo Simulation

VP#2 - Prospect Road (looking southeast to west)

Town of Villenova

Proposed Condition

FIGURE A3-o

Photo Simulation

VP#2 - Prospect Road (looking southeast to west)

Town of Villenova

Existing Condition

Proposed Condition

FIGURE A3-p

Photo Simulation

VP#2 - Prospect Road (looking southeast to west)

Town of Villenova

Photo taken during 2008.

Existing Condition

FIGURE A4-a

Photo Simulation

VP# 7 - Tri-County Country Club (looking west)

Town of Hanover

Proposed Condition

FIGURE A4-b

Photo Simulation

VP# 7 - Tri-County Country Club (looking west)

Town of Hanover

Photo taken during 2008.

Existing Condition

FIGURE A5-a

Photo Simulation

VP# 8 - NYS Route 39 (looking southeast to southwest)

Town of Hanover

Proposed Condition

FIGURE A5-b

Photo Simulation

VP# 8 - NYS Route 39 (looking southeast to southwest)

Town of Hanover

Photo taken during 2008.

Existing Condition

FIGURE A5-c

Photo Simulation

VP# 8 - NYS Route 39 (looking southeast to southwest)

Town of Hanover

Proposed Condition

FIGURE A5-d

Photo Simulation

VP# 8 - NYS Route 39 (looking southeast to southwest)

Town of Hanover

Photo taken during 2008.

Existing Condition

FIGURE A5-e

Photo Simulation

VP# 8 - NYS Route 39 (looking southeast to southwest)

Town of Hanover

Proposed Condition

FIGURE A5-f

Photo Simulation

VP# 8 - NYS Route 39 (looking southeast to southwest)

Town of Hanover

Existing Condition

Proposed Condition

FIGURE A5-g

Photo Simulation

VP# 8 - NYS Route 39 (looking southeast to southwest)

Town of Hanover

Photo taken during 2008.

Existing Condition

FIGURE A6-a

Photo Simulation

VP#13 - NYS Thruway I-90 (looking south)

Town of Hanover

Proposed Condition

FIGURE A6-b

Photo Simulation

VP#13 - NYS Thruway I-90 (looking south)

Town of Hanover

Photo taken during 2015.

Existing Condition

FIGURE A7-a

Photo Simulation

VP# 33 - NYS Route 83 (looking northeast to southeast)

Town of Arkwright

Proposed Condition

FIGURE A7-b

Photo Simulation

VP# 33 - NYS Route 83 (looking northeast to southeast)

Town of Arkwright

Photo taken during 2008.

Existing Condition

FIGURE A7-c

Photo Simulation

VP# 33 - NYS Route 83 (looking northeast to southeast)

Town of Arkwright

Proposed Condition

FIGURE A7-d

Photo Simulation

VP# 33 - NYS Route 83 (looking northeast to southeast)

Town of Arkwright

Existing Condition

Proposed Condition

FIGURE A7-e

Photo Simulation
VP# 33 - NYS Route 83 (looking northeast to southeast)
Town of Arkwright

Photo taken during 2015.

Existing Condition

FIGURE A8-a

Photo Simulation

VP# 36 - Boutwell Hill State Forest and Overland Trail (looking northeast)

Town of Arkwright

Proposed Condition

FIGURE A8-b

Photo Simulation

VP# 36 - Boutwell Hill State Forest and Overland Trail (looking northeast)

Town of Arkwright

Photo taken during 2015

Existing Condition

FIGURE A9-a

Photo Simulation

VP# 38 - Canadaway Creek WMA (looking northeast)

Town of Arkwright

Proposed Condition

FIGURE A9-b

Photo Simulation

VP# 38 - Canadaway Creek WMA (looking northeast)

Town of Arkwright

Photo taken during 2015.

Existing Condition

FIGURE A9-c

Photo Simulation

VP# 38 - Canadaway Creek WMA (looking northeast)

Town of Arkwright

Proposed Condition

FIGURE A9-d

Photo Simulation

VP# 38 - Canadaway Creek WMA (looking northeast)

Town of Arkwright

Existing Condition

Proposed Condition

FIGURE A9-e

Photo Simulation

VP# 38 - Canadaway Creek WMA (looking northeast)

Town of Arkwright

Photo taken during 2015

Existing Condition

FIGURE A10-a

Photo Simulation

VP# 42 - Hamlet of Hamlet (looking northwest)

Town of Villenova

Proposed Condition

FIGURE A10-b

Photo Simulation

VP# 42 - Hamlet of Hamlet (looking northwest)

Town of Villenova

Photo taken during 2015.

Existing Condition

FIGURE A11-a

Photo Simulation

VP# 47 - NYS Route 322 (looking northwest)

Town of Villenova

Proposed Condition

FIGURE A11-b

Photo Simulation

VP# 47 - NYS Route 322 (looking northwest)

Town of Villenova

Photo taken during 2015.

Existing Condition

FIGURE A11-c

Photo Simulation

VP# 47 - NYS Route 322 (looking northwest)

Town of Villenova

Proposed Condition

FIGURE A11-d

Photo Simulation

VP# 47 - NYS Route 322 (looking northwest)

Town of Villenova

Existing Condition

Proposed Condition

FIGURE A11-e

Photo Simulation

VP# 47 - NYS Route 322 (looking northwest)

Town of Villenova

Photo taken during 2008

Existing Condition

FIGURE A12-a

Photo Simulation

VP# 48 - NYS Route 83 (looking northwest)

Town of Villenova

Proposed Condition

FIGURE A12-b

Photo Simulation

VP# 48 - NYS Route 83 (looking northwest)

Town of Villenova

Photo taken during 2008.

Existing Condition

FIGURE A13-a

Photo Simulation

VP# 49 - Pine Valley Central Schools (looking north)

Town of Cherry Creek

Proposed Condition

FIGURE A13-b

Photo Simulation

VP# 49 - Pine Valley Central Schools (looking north)

Town of Cherry Creek

Photo taken during 2015.

Existing Condition

FIGURE A14-a

Photo Simulation

VP# 53 - Village of South Dayton/Hamlet of Skunks Center (looking northwest)

Village of South Dayton

Proposed Condition

FIGURE A14-b

Photo Simulation

VP# 53 - Village of South Dayton/Hamlet of Skunks Center (looking northwest)

Village of South Dayton

Photo taken during 2015.

Existing Condition

FIGURE A15-a

Photo Simulation

VP# 54 - Flucker Hill Road (looking southwest to northwest)

Town of Villenova

Proposed Condition

FIGURE A15-b

Photo Simulation

VP# 54 - Flucker Hill Road (looking southwest to northwest)

Town of Villenova

Photo taken during 2015.

Existing Condition

FIGURE A15-c

Photo Simulation

VP# 54 - Flucker Hill Road (looking southwest to northwest)

Town of Villenova

Proposed Condition

FIGURE A15-d

Photo Simulation

VP# 54 - Flucker Hill Road (looking southwest to northwest)

Town of Villenova

Photo taken during 2015.

Existing Condition

FIGURE A15-e

Photo Simulation

VP# 54 - Flucker Hill Road (looking southwest to northwest)

Town of Villenova

Proposed Condition

FIGURE A15-f

Photo Simulation

VP# 54 - Flucker Hill Road (looking southwest to northwest)

Town of Villenova

Photo taken during 2015.

Existing Condition

FIGUREA 15-g

Photo Simulation

VP# 54 - Flucker Hill Road (looking southwest to northwest)

Town of Villenova

Proposed Condition

FIGURE A15-h

Photo Simulation

VP# 54 - Flucker Hill Road (looking southwest to northwest)

Town of Villenova

Existing Condition

Proposed Condition

FIGURE A15-i

Photo Simulation

VP# 54 - Flucker Hill Road (looking southwest to northwest)

Town of Villenova

Photo taken during 2008.

Existing Condition

FIGURE A16-a

Photo Simulation

VP# 55 - County Route 93 (looking west)

Town of Hanover

Proposed Condition

FIGURE A16-b

Photo Simulation

VP# 55 - County Route 93 (looking west)

Town of Hanover

Photo taken during 2008.

Existing Condition

FIGURE A16-c

Photo Simulation

VP# 55 - County Route 93 (looking west)

Town of Hanover

Proposed Condition

FIGURE A16-d

Photo Simulation

VP# 55 - County Route 93 (looking west)

Town of Hanover

Existing Condition

Proposed Condition

FIGURE A16-e

Photo Simulation

VP# 55 - County Route 93 (looking west)

Town of Hanover

Appendix B

Cumulative Viewshed and Photographic Simulations

CUMULATIVE VEGETATED VIEWSHED*

Ball Hill Wind Project, Arkwright Summit Wind Farm, and Cassadaga Wind Project

*Assumes 40 foot (12.192 m) vegetation height in areas considered forested by the 2001 National Land Cover Dataset

Figure B1
December 2015

Turbine locations, pads, access roads, transmission line ROWs, and collector line ROWs reflect November 6, 2015 layout.

KEY

- Proposed Wind Turbine
- Cassadaga Wind Turbine
- Arkwright Summit Wind Turbine
- Potential Sensitive Resource
- Earl Cardot Eastside Overland Trail
- Equestrian Trail
- Snowmobile Trail
- County Boundary
- Municipal Boundary
- Cattaraugus Indian Reservation
- Water Body
- State Forest
- Wildlife Management Area

Number of Turbines Visible

- 1 - 5
- 6 - 10
- 11 - 15
- 16 - 20
- 21 - 30
- 31 - 45
- 46 - 60
- 61 - 75
- 76 - 90
- 91 - 110
- 111 - 136

Approximate Photo Angle

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New York City > Saratoga Springs > Syracuse

Photo taken during 2008.

Existing Condition

FIGURE B2-a

Photo Simulation

VP#33 - NYS Route 83 (looking northeast)

Town of Arkwright

Proposed Condition - Ball Hill Windpark

FIGURE B2-b

Photo Simulation

VP#33 - NYS Route 83 (looking northeast)

Town of Arkwright

Proposed Condition - Arkwright Summit Wind Farm and Cassadaga Wind Project

FIGURE B2-c

Photo Simulation

VP#33 - NYS Route 83 (looking northeast)

Town of Arkwright

Proposed Condition - Ball Hill Wind Project, Arkwright Summit Wind Farm and Cassadaga Wind Project

FIGURE B2-d

Photo Simulation

VP#33 - NYS Route 83 (looking northeast)

Town of Arkwright

Photo taken during 2008.

Existing Condition

FIGURE B2-e

Photo Simulation

VP#33 - NYS Route 83 (looking northeast)

Town of Arkwright

Proposed Condition - Ball Hill Windpark

FIGURE B2-f

Photo Simulation

VP#33 - NYS Route 83 (looking northeast)

Town of Arkwright

Proposed Condition - Arkwright Summit Wind Farm and Cassadaga Wind Project

FIGURE B2-g

Photo Simulation

VP#33 - NYS Route 83 (looking northeast)

Town of Arkwright

Proposed Condition - Ball Hill Wind Project, Arkwright Summit Wind Farm and Cassadaga Wind Project

FIGURE B2-h

Photo Simulation

VP#33 - NYS Route 83 (looking northeast)

Town of Arkwright

Existing Condition

Proposed Condition - Ball Hill Wind Project, Arkwright Summit Wind Farm and Cassadaga Wind Project

FIGURE B2-i

Photo Simulation

VP#2 - Prospect Road

Town of Villenova

Photo taken during 2015.

Existing Condition

FIGURE B3-a

Photo Simulation

VP# 54 - Flucker Hill Road (looking southwest to northwest)

Town of Villenova

Proposed Condition - Ball Hill Wind Project

FIGURE B3-b

Photo Simulation

VP# 54 - Flucker Hill Road (looking southwest to northwest)

Town of Villenova

Proposed Condition - Arkwright Summit Wind Farm and Cassadaga Wind Project

FIGURE B3-c

Photo Simulation

VP# 54 - Flucker Hill Road (looking southwest to northwest)

Town of Villenova

Proposed Condition - Ball Hill Wind Project, Arkwright Summit Wind Farm and Cassadaga Wind Project

FIGURE B3-d

Photo Simulation

VP# 54 - Flucker Hill Road (looking southwest to northwest)

Town of Villenova

Photo taken during 2015.

Existing Condition

FIGURE B3-e

Photo Simulation

VP# 54 - Flucker Hill Road (looking southwest to northwest)

Town of Villenova

Proposed Condition - Ball Hill Wind Project

FIGURE B3-f

Photo Simulation

VP# 54 - Flucker Hill Road (looking southwest to northwest)

Town of Villenova

Proposed Condition - Arkwright Summit Wind Farm and Cassadaga Wind Project

FIGURE B3-g

Photo Simulation

VP# 54 - Flucker Hill Road (looking southwest to northwest)

Town of Villenova

Proposed Condition - Ball Hill Wind Project, Arkwright Summit Wind Farm and Cassadaga Wind Project

FIGURE B3-h

Photo Simulation

VP# 54 - Flucker Hill Road (looking southwest to northwest)

Town of Villenova

Photo taken during 2015.

Existing Condition

FIGURE B3-i

Photo Simulation

VP# 54 - Flucker Hill Road (looking southwest to northwest)

Town of Villenova

Proposed Condition - Ball Hill Wind Project

FIGURE B3-j

Photo Simulation

VP# 54 - Flucker Hill Road (looking southwest to northwest)

Town of Villenova

Proposed Condition - Arkwright Summit Wind Farm and Cassadaga Wind Project

FIGURE B3-k

Photo Simulation

VP# 54 - Flucker Hill Road (looking southwest to northwest)

Town of Villenova

Proposed Condition - Ball Hill Wind Project, Arkwright Summit Wind Farm and Cassadaga Wind Project

FIGURE B3-I

Photo Simulation

VP# 54 - Flucker Hill Road (looking southwest to northwest)

Town of Villenova

Photo taken during 2015.

Existing Condition

FIGURE B3-m

Photo Simulation

VP# 54 - Flucker Hill Road (looking southwest to northwest)

Town of Villenova

Proposed Condition - Ball Hill Wind Project

FIGURE B3-n

Photo Simulation

VP# 54 - Flucker Hill Road (looking southwest to northwest)

Town of Villenova

Proposed Condition - Arkwright Summit Wind Farm and Cassadaga Wind Project

FIGURE B3-o

Photo Simulation

VP# 54 - Flucker Hill Road (looking southwest to northwest)

Town of Villenova

Proposed Condition - Ball Hill Wind Project, Arkwright Summit Wind Farm and Cassadaga Wind Project

FIGURE B3-p

Photo Simulation

VP# 54 - Flucker Hill Road (looking southwest to northwest)

Town of Villenova

Existing Condition

Proposed Condition- Ball Hill Wind Project, Arkwright Summit Wind Farm and Cassadaga Wind Project

FIGURE B3-q

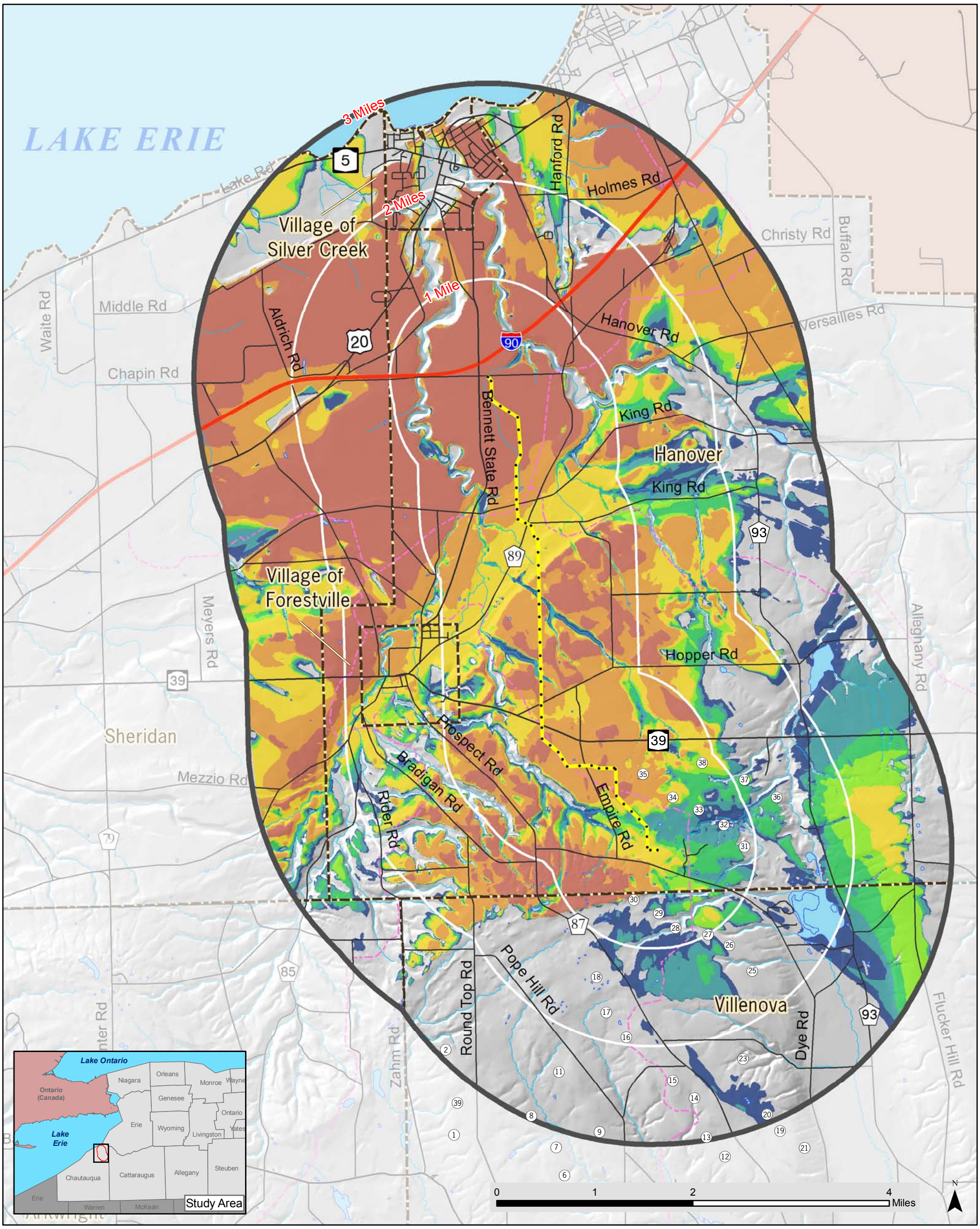
Photo Simulation

VP# 54 - Flucker Hill Road

Town of Villenova

Appendix C

230 kV Transmission Viewshed and Photographic Simulations



TRANSMISSION LINE TOPOGRAPHIC VIEWSHED

Ball Hill Wind Project

Figure C1
December 2015

Transmission Line Structure Locations based on December 2015 data.

KEY

- ① Proposed Wind Turbine
- • Transmission Line Structure
- Proposed Transmission Centerline
- Snowmobile Trail
- Municipal Boundary
- County Boundary
- Water Body

Number of Structures Visible

- 1 - 5
- 6 - 10
- 11 - 15
- 16 - 20
- 21 - 35
- 36 - 50
- 51 - 56

PROJECT # 2015 - 15039.10

This map is computer generated using data acquired by Saratoga Associates from various sources and is intended only for reference, conceptual planning and presentation purposes. This map is not intended for and should not be used to establish boundaries, property lines, location of objects or to provide any other information typically needed for construction or any other purpose when engineered plans or land surveys are required.

File Location:
B:\2012\12002\Maps\TLine151215\TLineTopoViewshed.mxd

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New York City > Saratoga Springs > Syracuse

TRANSMISSION LINE VEGETATED VIEWSHED*

Ball Hill Wind Project

*Assumes 40 foot (12.192 m) vegetation height in areas considered forested by the 2001 National Land Cover Dataset

Figure C2
December 2015

Transmission Line Structure Locations based on December 2015 data.

KEY

- ① Proposed Wind Turbine
- • Transmission Line Structure
- Proposed Transmission Centerline
- Snowmobile Trail
- Municipal Boundary
- County Boundary
- Water Body
- T1 Approximate Photo Angle with Photo Location ID

Number of Structures Visible

- 1 - 5
- 6 - 10
- 11 - 15
- 16 - 20
- 21 - 35
- 36 - 50
- 51 - 56

PROJECT # 2015 - 15039.10

This map is computer generated using data acquired by Saratoga Associates from various sources and is intended only for reference, conceptual planning and presentation purposes. This map is not intended for and should not be used to establish boundaries, property lines, location of objects or to provide any other information typically needed for construction or any other purpose when engineered plans or land surveys are required.

File Location: B:\2012\12002\Maps\TLine151215\TLineVegViewshed.mxd

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Photo taken during 2015.

Existing Condition

FIGURE C3-a

Photo Simulation

VP#T1 - NYS Route 39 (looking southwest to northwest)

Town of Hanover

Proposed Condition

FIGURE C3-b

Photo Simulation

VP#T1 - NYS Route 39 (looking southwest to northwest)

Town of Hanover

Photo taken during 2015.

Existing Condition

FIGURE C3-c

Photo Simulation

VP#T1 - NYS Route 39 (looking southwest to northwest)

Town of Hanover

Proposed Condition

FIGURE C3-d

Photo Simulation

VP#T1 - NYS Route 39 (looking southwest to northwest)

Town of Hanover

Photo taken during 2015.

Existing Condition

FIGURE C3-e

Photo Simulation

VP#T1 - NYS Route 39 (looking southwest to northwest)

Town of Hanover

Proposed Condition

FIGURE C3-f

Photo Simulation

VP#T1 - NYS Route 39 (looking southwest to northwest)

Town of Hanover

Photo taken during 2015.

Existing Condition

FIGURE C3-g

Photo Simulation

VP#T1 - NYS Route 39 (looking southwest to northwest)

Town of Hanover

Proposed Condition

FIGURE C3-h

Photo Simulation

VP#T1 - NYS Route 39 (looking southwest to northwest)

Town of Hanover

Existing Condition

Proposed Condition

FIGURE C3-i

Photo Simulation

VP#T1 - NYS Route 39 (looking southwest to northwest)

Town of Hanover

Photo taken during 2015.

Existing Condition

FIGURE C4-a

Photo Simulation

VP#T2 - King Road (looking west)

Town of Hanover

Proposed Condition

FIGURE C4-b

Photo Simulation
VP#T2 - King Road (looking west)
Town of Hanover