Cassadaga Wind Facility

Case No. 14-F-0490

1001.24 Exhibit 24

Visual Impacts

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EXHIBIT 24 VISUAL IMPACTS

(a) Visual Impact Assessment

A Visual Impact Assessment (VIA) was conducted to determine the extent and assess the significance of facility visibility. The VIA procedures used for this study are consistent with methodologies developed by various state and federal agencies, including the U.S. Department of the Interior, Bureau of Land Management (1980), U.S. Department of Agriculture, National Forest Service (1974), the U.S. Department of Transportation, Federal Highway Administration (1981), U.S. Army Corps of Engineers (Smardon, et al., 1988) and the NYSDEC (not dated, 2000). The components of the VIA include identification of visually sensitive resources, viewshed mapping, confirmatory visual assessment fieldwork, visual simulations (photographic overlays), cumulative visual impact analysis, and proposed visual impact mitigation. The VIA, included as Appendix VV to this Article 10 Application, addresses the following issues:

(1) Character and Visual Quality of the Existing Landscape

Per the definition set forth at 1000.2(ar), the visual study area to be used for analysis of major electric generating facilities is defined as "*an area generally related to the nature of the technology and the setting of the proposed site. For large facilities or wind power facilities with components spread across a rural landscape, the study area shall generally include the area within a radius of at least five miles from all generating facility components, interconnections and related facilities and alternative location sites. For facilities in areas of significant resource concerns, the size of a study area shall be configured to address specific features or resource issues*."

During the early stages of the VIA, a 10-mile visual study area was established for the purpose of identifying visually sensitive resources of regional and/or statewide significance. This was done in order to identify any potential "significant resource concerns" beyond five miles that would warrant the use of a larger study area. A more inclusive inventory of locally significant visually sensitive resources was conducted for the area within five miles of the proposed Facility. As described below in Section (b)(3) and in Section 3.6 of the VIA, through the public outreach process various stakeholders expressed interest in the resources identified in the range of five to 10 miles from the proposed Facility; therefore, the 10-mile-radius visual study area was utilized going forward for the various visual analyses presented herein (e.g., visual fieldwork, viewshed analysis, and simulations). However, the five-mile-radius visual study area was also retained for the purposes of discussing locally significant visually sensitive resources and because the area within five miles of a Facility typically represents the area within which significant visual effects may occur. The five-mile and 10-mile visual study area boundaries for the Facility are depicted on Figure 4 of the VIA and Figure 24-1 of this Exhibit.

The 10-mile-radius visual study area includes the northernmost extent of the Appalachian Plateau physiographic province (Fenneman & Johnson, 1946), as well as portions of the Central Lowland province along the south shore of Lake Erie. The topography ranges from gently sloping northward toward Lake Erie in the northern portion of the study area, to rolling ridges and valleys in the vicinity of the Facility and areas to the south. Steep slopes are confined to the ravines and gorges associated with streams such as the Cherry Creek (or their tributaries). Elevations within the visual study area range from approximately 587 to 2,115 feet above mean sea level (amsl).

Vegetation in the study area is characterized by a roughly 50:50 mix of open fields and forest. Open fields include active cropland and pasture, as well as successional old fields and shrubland, and generally occur on the more level or gently sloping areas within the study area. Forest vegetation is primarily deciduous (northern hardwoods) mixed with some conifers (white pine, hemlock and spruce) and typically occurs in wooded wetlands, woodlots, plantations, hedgerows and along stream corridors. Larger more contiguous areas of forest occur in the central, interior portion of the study area, and include Boutwell Hill, Hatch Creek, and Harris Hill State Forests.

Per the requirements set forth in 16 NYCRR § 1000.24(b)(1), Landscape Similarity Zones must be defined within the visual study area to be shown along with other indicators of potential visual impact (i.e. viewshed maps). Definition of discrete landscape types within a given study area provides a useful framework for the analysis of a project's potential visual effects. These landscape types, referred to in the VIA and this Exhibit as Landscape Similarity Zones (LSZs), are defined based on the similarity of various landscape characteristics including landform, vegetation, water, and/or land use patterns, in accordance with established visual assessment methodologies (Smardon et al., 1987; USDA Forest Service, 1995; USDOT Federal Highway Administration, 1981; USDI Bureau of Land Management, 1980). Within the visual study area, six distinct LSZs were defined. The approximate location of these zones is illustrated in Figure 5 of the VIA and Figure 24-2 of this Exhibit. LSZs within the study area are described in more detail in the VIA and include the following:

- Forest
- Rural Valley
- Rural Uplands/Ridgeline
- Villages/Hamlet
- Waterfront/Open Water
- Transportation Corridor

(2) Visibility of the Facility

The VIA includes an analysis of potential visibility and identifies locations within the visual study area where it may be possible to view the proposed installation and operation of the proposed wind turbines and 115 kV electrical generator lead line. This analysis included identifying potentially visible areas on viewshed maps and verifying line of sight conditions in the field. The purpose of these field visits was to verify the existence of direct lines of sight to the Facility as indicated by viewshed analysis, and to obtain photographs for subsequent use in the development of visual simulations.

Topographic and Vegetation viewshed maps were created to identify potential visibility of wind turbines and overhead interconnect structures. The methodology for these analyses is described in detail below in Section (b)(2) of this Exhibit and Section 4.1.1 of the VIA.

EDR personnel conducted visual field review in the study area on multiple dates from December 2015 to January 2016 (December 16, 2015, January 25, 2016, and February 5 and 6, 2015)[1]. During these site visits, EDR staff members drove public roads and visited public vantage points within the 10-mile radius study area to document locations from which the turbines would likely be visible, partially screened, or fully screened. This determination was made based on the visibility of the distinctive Facility site ridges/landforms, as well as existing tall structures (such as silos and temporary meteorological towers) on the Facility site, which served as locational and scale references. These site visits resulted in photographs from 170 representative viewpoints within the 10-mile study area. The viewpoints document potential visibility of the Facility from the various LSZs, distance zones, directions, visually sensitive resources, and area of high public use throughout the visual study area. A representative photograph documenting the general view towards the Facility site from each viewpoint is included in Appendix B of the VIA and the location of each viewpoint is shown on Figure 24-3.

The December 16, 2015 field review included raising four large (15-foot by 6-foot), blimp-shaped helium-filled balloons to a height of 500-feet above ground level (to serve as markers for potential turbine visibility). The balloons were placed in the approximate locations of proposed wind turbines along the perimeter of the proposed Facility layout. The purpose of this exercise was to verify visibility of the Facility, and provide locational and scale references in photographs selected for subsequent development of visual simulations. However, weather conditions during the December 16,

[1]Note: Photography used in the VIA was also supplemented by photographs obtained as part of the Historic-Architectural Resources Survey (also conducted by EDR staff) for the Project during November, 2015.

2015 site visit were not consistent with the predicted forecast, and remained overcast and cloudy through the middle of the afternoon. The overcast conditions obscured visibility of the balloons from some areas. Therefore, due to the weather conditions, the balloons did not serve as reliable proxies for the purpose of evaluating the potential visibility of the Facility throughout the entire study area. However, as noted above, the distinctive landforms and ridges within the Facility site, as well as existing tall structures, provided adequate scale and location references to allow for determination of potential Facility visibility.

Additional site visits were conducted in January and February to supplement the photography obtained on December 16, 2015. As shown in the photolog included in Appendix B of the VIA, this resulted in a set of photographs that document a range of weather and visibility conditions. It is worth noting that all of the visual field review was conducted during the leaf-off season and therefore the photographs depict the most conservative scenario in terms of potential Facility visibility.

During each site visit, field crews drove public roads and visited public vantage points within the 10-mile radius study area to document points from which the Facility would be visible. Photos were taken from 170 representative viewpoints using digital SLR cameras with a minimum resolution of six megapixels. All cameras utilized a focal length between 28 and 35 mm (equivalent to between 45 and 55 mm on a standard 35 mm film camera). This focal length is the standard used in visual impact assessment because it most closely approximates normal human perception of spatial relationships and scale in the landscape (CEIWEP, 2007). Viewpoint locations were determined using hand-held global positioning system (GPS) units and high resolution aerial photographs (digital ortho quarter quadrangles). The time and location of each photo were documented on all electronic equipment (cameras, GPS units, etc.) and noted on field maps and data sheets. Viewpoints photographed during field review generally represented the most open, unobstructed available views toward the Facility.

Field review confirmed that actual Facility visibility is likely to be more limited than suggested by viewshed mapping (Figure 24-7). This is due to the fact that trees within the study area provide more extensive and effective screening than assumed in these analyses (e.g., vegetation is more extensive than indicated on the USGS NLCD, and often taller than 40 feet in height), and screening provided by buildings is significant within more developed areas (e.g., the villages and hamlets). The results of EDR's field review, presented in detail with visual aids in Section 5.1.3 of the VIA, are summarized below and organized generally according to Landscape Similarity Zone.

Forest LSZ

Field review confirmed that actual visibility of the Facility from the Forest LSZ, which covers a majority of the study area, is very limited. Photographs of typical views from the Forest LSZ are included in Section 3.3.1 of the VIA (see Inset 1). Under leaf off conditions, the density of tall forest vegetation in larger forest stands, as well as small woodlots, block nearly all outward views toward the Facility site. Visually sensitive resources in this LSZ where field review confirmed no (or minimal) Facility visibility include Canadaway Wildlife Management Area (VIA Appendix B: Viewpoints 1, 4, 7); Boutwell Hill (Viewpoints 12-18), Hatch Creek, Harris Hill, and Stockton (Viewpoint 73) State Forests; Lake Erie State Park (Viewpoint 166); and most of the forested portions of the Earl Cardot Eastside Overland Trail (Viewpoints 12-18).

Field review from the Canadaway Wildlife Management Area and Earl Cardot Eastside Overland Trail confirmed that outward views from the Forest LSZ are generally limited to locations adjacent to ponds and small forest clearings, as represented by Viewpoints 4-8, 10, 13, and 15-18 (see VIA Appendix B). To evaluate potential Facility visibility from these areas, wireframe renderings were prepared for Viewpoints 13 and 18 (see VIA Inset 12). As shown in Inset 12 of the VIA, even in these areas adjacent to ponds where clearings provide the potential for outward views from interior forest areas, views of the facility will be fully or substantially screened. These views are representative of the screening effects of adjacent vegetation from the ponds and small forest clearings within the Forest LSZ.

In addition, there are some areas where public trail networks leave forested settings and traverse open fields or similar settings (e.g., Viewpoints 7, 8, 11, 82; see Inset 9 in Section 3.6.2 of the VIA). Some of these locations will afford open views of the Facility along the open portions of the trail network, consistent with the description of Facility visibility from the Rural Valley and Rural Upland LSZs, as described below.

Rural Valley LSZ

Field review indicates that potential Facility visibility within the Rural Valley LSZ is highly variable. Photographs of typical views from the Rural Valley LSZ are included in Section 3.3.2 of the VIA (see Inset 2). The siting considerations of a wind energy Facility require that the turbines to be sited on hilltops or ridgelines, outside of valley areas. In many of the rural valleys in the visual study area, where outward visibility is not screened by foreground buildings or vegetation, the most dominant visual feature is typically the nearest ridge and/or series of hills and ridges that define the valley (e.g., see VIA Appendix B: Viewpoints 8, 9, 22, 35, 41, 54, 63, 84, 92, 96, 99, 108, 116, 118, 128, 141, 142, 144). The portions of the Rural Valley LSZ that are agricultural often provide open views across flat valleys framed by ridges (see VIA Inset 13, Viewpoint 92). When located in proximity to the proposed Facility, such valley locations can provide unobstructed views of wind turbines on adjacent ridges. However, at greater distances, these ridges will be effective in blocking views of more distant turbines.

The Rural Valley LSZ also includes locations and areas where hedgerows, small forest stands, and/or residential and agricultural buildings may screen (or partially screen) longer distance views (e.g., see VIA Appendix B: Viewpoints 20, 30, 31, 34, 42, 46, 47, 48, 59, 60, 61, 64, 70, 82, 97, 105, 106, 107, 117, 121, 151, 153, 154). In locations within the Rural Valley LSZ that are adjacent to woodlots, hedgerows and roadside vegetation (Inset 13, Viewpoint 64), outward views are often completely or partially screened.

Visually sensitive resources located in the Rural Valley LSZ that may afford views of the Facility include scattered NRHP-eligible sites (farmsteads and cemeteries; Viewpoints 31, 34, 47, 64, 98, 151, 153, and 154) and portions of the Earl Cardot Eastside Overland Trail (Viewpoint 8) and New York Amish Trail (Viewpoint 116 and 117).

Rural Uplands/Ridgelines LSZ

The Rural Upland/Ridgeline LSZ generally offers the greatest opportunity for actual views of the Facility within the study area. Photographs of typical views from the Rural Upland/Ridgeline LSZ are included in Section 3.3.3 of the VIA (see Inset 3). Vantage points in areas of relatively high elevation minimize the screening effects of intervening topography, and often offer open foreground and long distance views toward ridge tops, where most Facility components are proposed to be located. Additionally, the open and agricultural character of the landscape within the majority of this zone allows for relatively open views from many locations (e.g., Viewpoints 26-29,38-40, 53, 66, 74-77, 80-81, 90-91, 93-94, 100-101, 133, 135, 139-140, 149-150, 163-165). However, as shown in Inset 14, many areas within this LSZ will have limited Facility visibility due to screening provided by intervening topography, vegetation, and buildings (e.g., Viewpoints 2, 68, 71, 72, 79, 86, 120, 134, 136, 139, 146-148).

This LSZ has relatively fewer visually sensitive resources than some of the other LSZs due to the low density of human settlement/development. Portions of the Earl Cardot Overland Trail, snowmobile trails, and equestrian trail networks cross open areas within the Rural Upland/Ridgeline LSZ (Viewpoint 10, 11). The New York State Amish Trail, which runs through the eastern portion of the visual study area, occurs primarily within the Rural Upland/Ridgeline LSZ (see Viewpoints 25, 26, 139, 140; VIA Insets 3 and 14). The Cockaigne Ski Resort is also located in this LSZ, but as shown in VIA Inset 15 (Viewpoint 146), views of the Facility from the entrance of the resort will be partially screened by vegetation. It is likely that a more open view of the Facility would be available from higher elevations at the ski area, although this was not evaluated during field review.

Village/Hamlet LSZ

Actual visibility of the Facility from the Village/Hamlet LSZ, as confirmed by field review, is anticipated to be variable. Photographs of typical views from the Village/Hamlet LSZ are included in Section 3.3.4 of the VIA (see Inset 4). In many portions of the villages and hamlets within the study area, buildings and yard vegetation screen outward views. In these areas views of the Facility will be mostly limited to partial and/or partially screened views of turbines in gaps between buildings and vegetation. As shown in VIA Inset 16, topography and vegetation will often partially or fully screen views unless the Facility is located on a ridge or open agricultural area directly adjacent to the village or hamlet. Appendix B includes representative views from the Villages of Cherry Creek (Viewpoints 49-51, 145, 155-157), Sinclairville (Viewpoints 56-58, 103-104, 87-89), South Dayton (Viewpoints 44-45), and Cassadaga (Viewpoints 65, 131, 158-160).

Open outward views are rare within a village/hamlet setting. Areas with the best opportunity for more open views within this LSZ are generally located on the outskirts of these developed areas, or where relatively large areas of unvegetated land (i.e. parks, ponds etc.) occur within a village or hamlet. Appendix B includes representative views from the hamlets of Ellington (Viewpoint 21), Clear Creek (Viewpoint 23), Conewango Valley (Viewpoint 24), Leon (Viewpoint 26), Balcom Corners (Viewpoint 32), Black Corners (Viewpoints 36-37), Stockton (Viewpoint 69), Burnhams (Viewpoint 108) and Gerry Viewpoint 110). Overall, the less-densely settled hamlets in the study area provide more opportunities for Facility visibility than the City and Villages (e.g., Dunkirk, Fredonia, Cherry Creek, Sinclairville, South Dayton, and Cassadaga).

This LSZ is the location of most of the NHRP-Listed and Eligible properties in the study area. Views available from these visually sensitive resources will depend on their location within a given hamlet or village. As illustrated in the wireframe renderings included in VIA Inset 16, views from areas of dense development will be partially screened or include a limited number of turbines (e.g., narrow views available between nearby structures or through gaps in vegetation), while open views are more likely from historic sites on the periphery of the villages and hamlets.

Waterfront/Open Water LSZ

Field review of the limited areas of the Waterfront/Open Water LSZ that occur within the study area indicated that actual Facility visibility is likely to be very limited. Photographs of typical views from the Waterfront/Open Water LSZ are included in Section 3.3.5 of the VIA (see Inset 5). Waterfront and open water areas offer relatively open outward views when compared to other landscape types due to the lack of screening by foreground topography, vegetation or buildings. However, in this study area, the Waterfront/Open Water LSZ is largely limited to small ponds and lakes surrounded by tall trees (and in some instances, notably Chautauqua Lake, steep slopes) which limits long-distance views. Waterbodies that were visited during the field review included ponds within the Canadaway Management Area (Viewpoints 4 and 6) and Boutwell Hill State Forest (Viewpoints 13, 15-18); Cassadaga Lake – Upper Lake (Viewpoint 130), Middle Lake (Viewpoints 67, 109, 129, 132), Chautauqua Lake (Viewpoint 126). In these areas there are opportunities for outward views of the Facility (See Inset 5: Viewpoint 6). In addition, as discussed in Section 5.2 of the VIA, a visual simulation was prepared for Viewpoint 132, which shows an open view across Middle Lake. In this view, the blades of a few turbines can be seen extending above the tree tops on the opposite side of the lake. The simulation is representative of the screening effect topography and vegetation on views of the Facility from the Waterfront/Open Water LSZ.

The largest area of the Waterfront\Open Water LSZ is the shoreline and surface of Chautauqua Lake, located on the southwestern outskirts of the 10-mile study area. As described above in Section 5.1.1 of the VIA, viewshed analysis indicates virtually no potential turbine visibility from this portion of the study area, including in the vicinity of the NRHP-Listed Chautauqua Institution. In addition, field review was conducted in this area to investigate potential Facility visibility from the Institution and adjacent shoreline (see Figure 24-5). As shown in Figure 24-5, the combined topographic and vegetation viewshed analysis predicts that there are limited areas within and adjacent to the Chautauqua Institution where a small number of turbines could potentially be visible. Field review included documentation of six viewpoints in this area (Viewpoints 121-126; see Figure 24-5). As shown in these photos, the forested ridgeline that rises in the mid-ground above the northeastern shore of Chautauqua Lake effectively screens views towards more distant landscape features, including the Facility site. If any of the proposed Facility is visible from these areas (located greater than 10 miles from the Facility), it is anticipated that this would be limited to only the tip of a turbine blade. The remainder of the turbines would be screened by the forest vegetation on the intervening ridgeline.

Transportation Corridors LSZ

Field review revealed that potential Facility visibility from the Transportation Corridors LSZ will be highly variable. This LSZ consists of the corridor of Interstate Routes 88, 90, and NYS Route 60 as they travel across the study area. Due to their length, these areas run through a variety of different settings from relatively densely settled hamlets, to agricultural valleys and uplands, and areas with substantial forest cover. Photographs of typical views from the Transportation Corridors LSZ are included in Section 3.3.6 of the VIA (see Inset 6). Field review confirmed that distant views of the Facility will be available from limited locations on Interstates 88 (Viewpoint 114) and 90, both of which are located more than eight miles from the Facility. As described below in Section 5.2 of the VIA, a visual simulation was prepared for Viewpoint 114 to provide a representative depiction of the potential visual effect of the Facility from the distant interstates, which is anticipated to be minimal.

Portions of NYS Route 60 run closer to the Facility and will provide more opportunities for Facility visibility. However, visibility of the proposed turbines from visually sensitive resources along NYS Route 60 closer to the facility are likely to be at least partially screened by vegetation and topography. For example, while views of the Facility will be possible from portions of the NYSDOT James A. France Memorial Rest Area on NYS Route 60, vegetation will significantly screen visibility of the proposed wind turbines from this location (see VIA Inset 17).

(3) Visibility of Above-ground Interconnections and Roadways

Topographic and vegetation viewshed maps were also prepared for the proposed 115kV generator lead that will connect the Facility's Collection and Interconnection substations. Design information for the generator lead was preliminary at the time the analysis was performed, however, it is assumed for the purposes of the VIA and this Application that there will be 101 structures ranging up to 95 feet in height along the 5.5-mile length of the line (see Figure 2-2 from Exhibit 2, and 24-6). It is likely that poles will vary in height and a number of poles will be below this assumed maximum height. The viewshed analysis described above assisted in identification of locations within the visual study area where it may be possible to view the above ground transmission structures from ground-level vantage points. Analysis of visibility of these structures also included identifying potentially visible areas on viewshed maps and verifying line of sight conditions in the field. Additionally, access roads are included in all visual simulations in which they would be visible. The results of this viewshed analysis are shown on Figure 24-7, Sheets 5 and 6.

In addition, the Facility includes approximately 6.6-miles of proposed overhead collection line, which will run in four segments: along the north side of Boutwell Hill Road through Boutwell Hill State Forest, on the west side of Wheeler Brook, crossing County Route 85 west of the intersection with Plank Road, and in the vicinity of the intersection of County Route 85 and Sanford Road (see Figure 2-2 in Exhibit 2). The engineering design for the overhead collection line has not been completed; however, the maximum height of the overhead collection line structures is not anticipated to exceed 55 feet (see Figure 24-6). To illustrate the potential visual effect of the overhead collection line, a rendering (based on the assumed maximum height of the proposed collection line structures) of the overhead collection line along Boutwell Hill Road is included as Figure 24-8. As shown in these renderings, the proposed structures and associated clearing will be clearly visible from Boutwell Hill Road. However, the anticipated height of the collection line poles is generally consistent with the adjacent forest vegetation, which will screen views of the structures from other areas. In addition, the proposed collection line has been sited within an existing roadway corridor to minimize the potential need for forest clearing in undisturbed areas. The overall effect of the overhead collection line is anticipated to be minimal due to the limited areas from which it will be visible.

(4) Appearance of the Facility Upon Completion

To show anticipated visual changes associated with the proposed Facility, high-resolution computer-enhanced image processing was used to create realistic photographic simulations of the proposed Facility from each of the fourteen selected viewpoints. The photographic simulations were developed by using Autodesk 3ds Max Design 2015® to create a simulated perspective (camera view) to match the location, bearing, and focal length of each existing conditions photograph. Existing elements in the view (e.g., topography, buildings, roads) were modeled based on aerial photographs and DEM data in AutoCAD Civil 3D 2014®. A three dimensional ("3-D") topographic mesh of the landform (based on DEM data) was then brought into the 3-D model space. At this point minor adjustments were made to camera and target location, focal length, and camera roll to align all modeled elements with the corresponding elements in the photograph. This assures that any elements introduced to the model space (i.e., the proposed turbines) will be shown in proportion, perspective, and proper relation to the existing landscape elements in the view. Consequently, the alignment, elevations, dimensions and locations of the proposed Facility structures will be accurate and true in their relationship to other landscape elements in the photograph.

A computer model of the proposed turbine layout was prepared based on specifications and data provided by the Facility Developer. For the purposes of this analysis it was assumed that all turbines would be Vestas V112 (3.0 MW) machines with a hub height of 96 meters (315 feet) and a rotor diameter of 112 meters (367 feet; see Figure 24-6) as this is the tallest turbine model under consideration for the Facility. All turbine rotors were modeled facing into the prevailing wind (i.e., oriented to the west). Using the camera view as guidance, the visible portions of the modeled turbines were imported to the landscape model space described above, and set at the proper coordinates. Coordinates for proposed turbines, were provided to EDR by the Applicant.

Once the proposed Facility was accurately aligned within the camera view, a lighting system was created based on the actual time, date, and location of the photograph. Using the Mental Ray Rendering System® with Final Gather and Mental Ray Daylight System® within the Autodesk 3ds Max Design 2015® software, light reflection, highlights, color casting, and shadows were accurately rendered on the modeled Facility based on actual environmental conditions represented in the photograph. The rendered Facility was then superimposed over the photograph in Adobe Photoshop CS5® and portions of the turbines that fall behind vegetation, structures or topography were masked out. Photoshop was also used to take out any existing structures or vegetation proposed to be removed as part of the Facility. Once the turbines were added to the photo, any shadows cast on the ground by the proposed structures were also included by rendering a separate "shadow pass" over the DEM model in Autodesk 3ds Max Design 2015® and then overlaying the shadows on the simulated view with the proper fall-off and transparency using Adobe Photoshop CS5®. A graphic illustration of the simulation process is included in Figure 24-9.

The visual simulations for the Facility are included as Figure 24-10 and are further discussed in Section 5.2 of the VIA.

In addition, for some views, "wireframe renderings" were prepared to illustrate the potential screening effect of vegetation or other features in the photograph from a given viewpoint that screen or partially screen views of the Facility. In these wireframe renderings, the portions of the proposed turbines that will be screened by vegetation (or other factors) are shown in a bright green color (for illustrative purposes). In some instances, these wireframe renderings were prepared for viewpoints that were being considered as candidates for visual simulations to determine the potential visibility of the Facility (and therefore, whether the viewpoint was a good candidate for a visual simulation). In other instances, wireframe renderings were prepared for the explicit purpose of illustrating the effects of screening. The wireframe renderings are included as Insets to illustrate the discussion of potential Facility visibility included in Section 5.1.3 of the VIA.

(5) Lighting

The potential visibility of FAA warning lights for the proposed turbines is described in Section 5.1.1 of the VIA and Section (b)(1) of this Exhibit (see Figure 24-7). Nighttime photos from the Fenner Wind Power Facility (Figure 24-11), which is located in Madison County in New York State and has been in operation since 2001 are included to illustrate the type of nighttime visual impact that could occur at certain viewpoints. The contrast of the aviation warning lights with the night sky could be appreciable in dark, rural settings, and their presence suggests a more commercial/industrial land use. Viewer attention is drawn by the flashing of the lights, and any positive reaction that wind turbines engender (due to their graceful form, association with clean energy, etc.) is lost at night. While generally not an issue from roads and public resources visited almost exclusively during the day (parks, trails, historic sites, etc.), turbine lighting could be perceived negatively by area residents who may be able to view these lights from their homes and yards. However, this impact will be limited in areas of more concentrated human settlement, where existing light sources will limit the visibility and contrast of the aviation warning lights.

It should be noted that the size and brightness of the lights depicted in Figure 24-11 are due to the use of a long exposure during photography to ensure that the lights were visible in the photographs, and therefore, are not representative of what would be seen with the naked eye. It is also worth noting that FAA warning lights flash, which is not depicted in these photographs. In addition, the Fenner Wind Power Facility pre-dates current FAA regulations, and all 20 turbines were required to be lit. The viewshed analysis presented in Section 5.1.1 of the VIA is based on the conservative assumption that all turbines could be equipped with FAA warning lights. However, it is anticipated that only some (typically around half) of the turbines will actually be lit, as determined in consultation with the FAA. For all these reasons, the appearance of the lights presented in Figure 24-11 illustrates an extremely conservative (worst-case) analysis of potential nighttime visibility.

To minimize potential nighttime impacts from exterior lighting associated with the proposed Facility (O&M Building, Substations), all exterior lighting for the proposed facility will be “fully shielded” by fitting with opaque hoods, shields, louvers, shades, and other devices to insure that all light generated by the light source is directed downward and not outward horizontally. The use of “fully shielded” or “full cut-off” fixtures as indicated will minimize potential impacts from exterior lighting to the greatest extent practicable.

(6) Photographic Overlays

To show anticipated visual changes associated with the proposed Facility, high-resolution computer-enhanced image processing was used to create realistic photographic simulations of the completed turbines from each of the fourteen selected viewpoints. See Section (a)(4) above for discussion of the methodology and specific software packages that were used for creating the simulations. The visual simulations for the Facility are included as Figure 24-10 and are further discussed in Section 5.2 of the VIA.

(7) Nature and Degree of Visual Change from Construction

Visual impacts during construction are anticipated to be relatively minor and temporary in nature. Representative photographs of construction activities are included in Figure 24-12. As shown on these photographs, anticipated visual effects during construction include the following:

- During construction, there will be a temporary increase in truck traffic on area roadways served by the Facility. Construction vehicles for the Facility will include conventional construction trucks, crane transporters, concrete trucks, and oversized semi-trailers.
- The transportation of turbine components and associated construction material involves numerous conventional and specialized transportation vehicles. For instance, wind turbine blades are transported on trailers with one blade per vehicle. Blades typically control the length of the vehicle, and the radius of the curves along the travel route to the site. Specialized transport vehicles are designed with articulating (manual

or self-steering) rear axles to allow maneuverability through curves. Tower sections are typically transported in three to four sections depending on the supplier (one section per truck). Towers generally control the height and width of the transportation vehicle.

- As described in Exhibit 25 of this Article 10 Application, it is anticipated that temporary widening of the pavement surface with an aggregate roadway surface will be required to accommodate the turning movements of delivery vehicles in some locations, including some road intersections. These will generally be removed at the completion of construction. After completion of construction activities, there may be permanent road improvements needed to address any damage caused by the heavy construction vehicle traffic (especially on any roads that had temporary repairs made during construction activities).
- As described in Exhibits 21 and 22 of this Article 10 Application, construction and operation of the Facility will result in impacts to soils and on-site plant communities. These impacts include vegetation clearing and disturbance from construction, as well as permanent loss of vegetated habitats by conversion to built facilities. Permanent built facilities include turbine foundations and pads, access roads, an O&M building, meteorological tower foundations, transmission line and overhead collection line poles, the collection substation, and the POI substation.
- The construction laydown yard will be developed by stripping the topsoil, grading as necessary, and installation of a level gravel-surfaced working area. Electric and communication lines will be brought in from existing distribution poles to allow connection with construction trailers. During Facility construction, the yard will be occupied by vehicles, construction trailers and stockpiled materials.
- Facility construction will be initiated by clearing woody vegetation from all turbine sites, access roads, and electrical collection line routes. Trees cleared from the work area will be removed and disposed of off-site. It is generally assumed that a radius of up to 200 feet will be cleared around each turbine, a 75-foot wide corridor will be cleared along access roads, and a 40-foot-wide corridor will be cleared along underground electric collection lines that are not adjacent to access roads. In addition, a 100-foot-wide corridor will be cleared along overhead sections of the electrical collection lines, and the generator lead line.
- Wherever feasible, existing roads and farm drives will be upgraded for use as Facility access roads in order to minimize impacts to active agricultural areas, forest, and wetland/stream areas. Road construction will involve topsoil stripping and grubbing of stumps, as necessary. Stripped topsoil will be stockpiled along the road corridor for use in site restoration. Following removal of topsoil, subsoil will be graded, compacted, and surfaced with gravel or crushed stone. During construction, access roads with a travel surface of up to 40 feet wide will be required to accommodate large cranes and oversized construction vehicles. This road width will be narrowed to 16 feet following completion of construction.

- Once the roads are complete for a particular group of turbine sites, turbine foundation construction will commence on that completed access road section. Initial activity at each tower site will typically involve clearing and leveling (as needed) up to a 200-foot radius around each tower location. Topsoil will be stripped from the excavation area, and stockpiled for future site restoration. Following topsoil removal, tracked excavators will be used to excavate the foundation hole. Subsoil and rock will be segregated from topsoil and stockpiled for reuse as backfill. Once the foundation concrete is sufficiently cured, the excavation area around and over it is backfilled with the excavated on-site material. The base of each tower will be surrounded by a 6-foot wide gravel skirt, and an area approximately 100 feet by 60 feet will remain as a permanent gravel crane pad.
- Whenever possible, underground collection lines will be installed by direct burial, which involves the installation of bundled cable (electrical and fiber optic bundles) directly into a narrow cut or “rip” in the ground. The rip disturbs an area approximately 24 inches wide with bundled cable installed to a minimum depth of 36 inches. Where direct burial is not possible, an open trench will be excavated. Using this installation technique, topsoil and subsoil are excavated, segregated, and stockpiled adjacent to the trench. Following cable installation, the trench is backfilled with suitable fill material and any additional spoils are spread out or otherwise properly disposed of. Following installation of the buried collection line, areas will be returned to pre-construction grades.
- Turbine assembly and erection involves mainly the use of large track mounted cranes, smaller rough terrain cranes, boom trucks, and rough terrain fork-lifts for loading and off-loading materials. The tower sections, rotor components, and nacelle for each turbine will be delivered to each site by flatbed trucks and unloaded by crane. A large erection crane will set the tower segments on the foundation, place the nacelle on top of the tower, and install the rotor either by individual blade installation or, following ground assembly, place the rotor onto the nacelle. The visibility of these cranes will be comparable to the visibility of the proposed turbines (in terms of height). However, use of crane equipment at each turbine site will be on a temporary basis sufficient to complete construction activities.
- Vegetation removal will be minimized primarily through careful site planning. Large areas of forest and wetland are being avoided to the extent practicable. Facility access roads will be sited on existing farm lanes and forest roads wherever possible, and areas of disturbance will be confined to the smallest area possible. In addition, a comprehensive sediment and erosion control plan will be developed and implemented prior to Facility construction to protect adjacent undisturbed vegetation and aquatic resources. In addition to protecting natural resources, these measures will minimize the visual impact associated with landscape clearing and disturbance during construction of the Facility.

- Following construction activities, temporarily disturbed areas will be restored to original grades (where feasible) and seeded (and stabilized with mulch and/or straw if necessary) to reestablish vegetative cover in these areas. Other than in active agricultural fields, native species will be allowed to revegetate these areas. This will avoid long term visual impacts associated with soil and vegetation disturbance during construction.

(8) Nature and Degree of Visual Change from Operation

To evaluate anticipated visual change, the photographic simulations of the completed Facility were compared to photos of existing conditions from each of the 14 selected viewpoints. These "before" and "after" photographs, identical in every respect except for the Facility components shown in the simulated views, were provided as 11 x 17 inch color prints to three registered landscape architects (two in-house and one independent), who were then asked to determine the effect of the proposed Facility in terms of its contrast with existing elements of the landscape. The methodology utilized in this evaluation is a simplified version of the U.S. Bureau of Land Management (BLM) contrast rating methodology (USDI BLM, 1980) that was developed by EDR in 1999 for use on wind power projects. It involves using a short evaluation form, and a simple numerical rating process. Along with having proven to be accurate in predicting public reaction to wind power Facilities, this methodology 1) documents the basis for conclusions regarding visual impact, 2) allows for independent review and replication of the evaluation, and 3) allows a large number of viewpoints to be evaluated in a reasonable amount of time. Landscape, viewer, and Facility related factors considered by the landscape architects in their evaluation included the following:

- *Landscape Composition:* The arrangement of objects and voids in the landscape that can be categorized by their spatial arrangement. Basic landscape components include vegetation, landform, water and sky. Some landscape compositions, especially those that are distinctly focal, enclosed, detailed, or feature-oriented, are more vulnerable to modification than panoramic, canopied, or ephemeral landscapes.

- *Form, Line, Color, and Texture*: These are the four major compositional elements that define the perceived visual character of a landscape, as well as a Facility. Form refers to the shape of an object that appears unified; often defined by edge, outline, and surrounding space. Line refers to the path the eye follows when perceiving abrupt changes in form, color, or texture; usually evident as the edges of shapes or masses in the landscape. Texture in this context refers to the visual surface characteristics of an object. The extent to which form, line, color, and texture of a Facility are similar to, or contrast with, these same elements in the existing landscape is a primary determinant of visual impact.

- *Focal Point*: Certain natural or man-made landscape features stand out and are particularly noticeable as a result of their physical characteristics. Focal points often contrast with their surroundings in color, form, scale or texture, and therefore tend to draw a viewer's attention. Examples include prominent trees, mountains and water features. Cultural features, such as a distinctive barn or steeple can also be focal points. If possible, a proposed Facility should not be sited so as to obscure or compete with important existing focal points in the landscape.

- *Order*: Natural landscapes have an underlying order determined by natural processes. Cultural landscapes exhibit order by displaying traditional or logical patterns of land use/development. Elements in the landscape that are inconsistent with this natural order may detract from scenic quality. When a new Facility is introduced to the landscape, intactness and order are maintained through the repetition of the forms, lines, colors, and textures existing in the surrounding built or natural environment.

- *Scenic or Recreational Value*: Designation as a scenic or recreational resource is an indication that there is broad public consensus on the value of that particular resource. The particular characteristics of the resource that contribute to its scenic or recreational value provide guidance in evaluating a Facility's visual impact on that resource.

- *Duration of View*: Some views are seen as quick glimpses while driving along a roadway or hiking a trail, while others are seen for a more prolonged period of time. Longer duration views of a Facility, especially from significant aesthetic resources, have the greatest potential for visual impact.

- *Atmospheric Conditions*: Clouds, precipitation, haze, and other ambient air related conditions, which affect the visibility of an object or objects. These conditions can greatly impact the visibility and contrast of landscape and Facility components, and the design elements of form, line, color, texture, and scale.

- *Lighting Direction*: Backlighting refers to a viewing situation in which sunlight is coming toward the observer from behind a feature or elements in a scene. Front lighting refers to a situation where the light source is coming from behind the observer and falling directly upon the area being viewed. Side lighting refers to a viewing situation in which sunlight is coming from the side of the observer to a feature or elements in a scene. Lighting direction can have a significant effect on the visibility and contrast of landscape and Facility elements.

- *Project Scale*: The apparent size of a proposed Facility in relation to its surroundings can define the compatibility of its scale within the existing landscaping. Perception of Facility scale is likely to vary depending on the distance from which it is seen and other contextual factors.

- *Spatial Dominance*: The degree to which an object or landscape element occupies space in a landscape, and thus dominates landscape composition from a particular viewpoint.

- *Visual Clutter*: Numerous unrelated built elements occurring within a view can create visual clutter, which adversely impacts scenic quality.

- *Movement*: Moving Facility components can make them more noticeable, but in the case of wind turbines, have also been shown to also make them appear more functional and visually appealing. Numerous studies have documented that viewers prefer to see wind turbines in motion. The following quote and citations are taken from an on-line summary of perceptional studies of wind farms conducted by the Macaulay Land Research Institute (MLURI, 2010):

> *"Motion has also been indicated as a powerful predictor of preference (Gipe, 1993; Thayer and Freeman, 1987). This is a unique feature of wind turbines in comparison with other forms of static structures. People find wind farms that appear to be working by relating this with moving rotors as more attractive than those that do not. Motion is equated with lower perceived visual impact (Gipe, 1993). They are likely to find wind farms visually interesting because of their motion. In this mode, the turbines are perceived as abstract sculptures, arousing interest with their novel, unfamiliar forms and animation (Thayer and Hansen, 1988)."*

(9) Operational Effects of the Facility

To determine operational effects of the Facility EDR (2016c) conducted a Shadow Flicker analysis. The analysis looked at the potential shadow flicker occurrence on nearby potential receptors, including number of potential receptors and predicted annual hours of shadow flicker at each receptor. Shadow flicker was previously discussed in Exhibit (15)(e)(4) and the Shadow Flicker Report is provided as Appendix U to this Application. Below is a summary of the shadow flicker analysis.

No consistent national, state, county, or local standards exist for allowable frequency or duration of shadow flicker from wind turbines at the proposed Facility Site. In general, quantified limits on shadow flicker are uncommon in the United States because studies have not shown it to be a significant issue (USDOE, 2008, 2012; NRC, 2007). However, based on standards developed by some states and countries a threshold of 30 shadow flicker hours per year was applied to the analysis of the proposed Facility to identify any potentially significant impacts on identified non-participating receptors.

A summary of the projected shadow flicker at each of the 519 receptors located within a 10 rotor diameter radius of all proposed turbine locations is presented below. Because the shadow flicker analysis conducted for the proposed Facility was based on the conservative assumptions that 1) all 58 turbines will be built, 2) the turbines are in continuous operation during daylight hours, and 3) that shadow flicker can be perceived at a receptor structure regardless of the presence or orientation of windows or the screening effects of all surrounding trees and buildings, the analysis presented herein is a conservative projection of the shadow-flicker effects at ground level.

- 147 (28%) of the receptors are not expected to experience any shadow flicker,
- 10 (2%) of the receptors may be affected 0-1 hour/year,
- 167 (32%) of the receptors may be affected 1-10 hours/year,
- 95 (18%) of the receptors may be affected 10-20 hours/year,
- 45 (9%) of the receptors may be affected 20-30 hours/year,
- 55 (11%) of the receptors may be affected for more than 30 hours/year.

Results of the shadow flicker analysis for the Cassadaga Wind Facility indicate that up to 55 receptors could exceed the 30-hour threshold. However, 32 of these receptors (58%) are located on properties owned by Facility participants. The details regarding anticipated shadow flicker at all structures predicted to receive in excess of 30 hours are summarized in Exhibit 15 and Table 1 of the Shadow Flicker Report (Appendix U).

Although shadow flicker at these receptors exceeds the 30-hour per year threshold, these calculations do not take into account the actual location and orientation of windows, or the screening effects associated with existing, site-specific conditions and obstacles such as trees (i.e., does not take into account the results of the viewshed analysis) and/or buildings. Further, this analysis assumes turbine rotors are continuously in motion. Given these assumptions, the predicted shadow-flicker frequency represents a conservative scenario, and almost certainly overstates the actual frequency of shadow flicker that would be experienced at any given receptor location. In addition, many of the modeled shadow flicker hours are expected to be low intensity because they would occur during the early morning or late afternoon hours when the sun is low in the sky. As the sun sinks below the horizon, more of its light is scattered by the atmosphere, which has the effect of dampening its brightness and therefore reducing its ability to cast dark shadows

(EMD, 2013). Results of predicted shadow flicker at each receptor is provided in Attachment B of the Shadow Flicker Report (see Appendix U).

To provide a more realistic prediction of where shadow flicker will actually be perceived, *WindPRO* model results were compared to the results of the viewshed analysis conducted for the Facility. The viewshed analysis indicates that 11 of the 23 non-participant receptors predicted to experience over 30 hours of shadow flicker will not have views of the Facility due to screening provided by mapped topography and vegetation. Further results and discussion are provided in Exhibit 15 and Table 2 of the Shadow Flicker Report (Appendix U).

A qualitative review of the potential impact from shadow flicker on recreational areas was also assessed. Recreational resources (parks, trails, campgrounds) were mapped in relation to the shadow flicker model results/isolines (see Appendix U, Figure 4). The Earl Cardot Eastside Overland Trail, the Equestrian Trail, the regional Snowmobile Trails, and the Boutwell Hill State Forest are located within the Study Area, and portions of these recreational areas will experience shadow flicker. In general however, the Facility will have minimal impact on recreational areas because viewers will not be subject to shadow flicker for extended periods of time. In addition, based on the viewshed analysis, a large portion of the recreational resources that are within the Study Area are anticipated to have limited to no views of Facility turbines, therefore, limiting and/or eliminating shadow flicker from these areas.

In summary, adverse shadow flicker impacts are not anticipated. Of the 55 receptors predicted to exceed the 30-hour threshold, 32 are Facility participants, while the remaining 23 are non-participating property owners. Additional evaluation through viewshed analysis revealed that 11 of the 23 non-participating receptors are not anticipated to receive any shadow flicker due to the extent of the screening by intervening vegetation. However, because the final turbine model is not known, and to provide a conservative, worst-case analysis, this study evaluates the potential impact of 58 turbines with the largest rotor diameter. Therefore, it is anticipated that the number of hours per year that some receptors will experience shadow flicker will be less than modeled. A discussion of mitigation options are provided in Exhibit 15 and the Shadow Flicker Report (Appendix U).

(10) Measures to Mitigate for Visual Impacts

Mitigation options are limited, given the nature of the Facility and its siting criteria (very tall structures typically located in open fields at the highest locally available elevations). However, in accordance with NYSDEC Program Policy (NYSDEC, 2000), various mitigation measures were considered. These included the following:

A. Professional Design. All turbines will have uniform design, speed, color, height and rotor diameter. Turbines will be mounted on conical steel towers that minimize visual clutter. The placement of any advertising devices (including commercial advertising, conspicuous lettering, or logos identifying the Facility owner or turbine manufacturer) on the turbines will be prohibited.

B. Screening. Due do the height of individual turbines and the geographic extent of the proposed Facility, screening of individual turbines with earthen berms, fences, or planted vegetation will generally not be effective in reducing Facility visibility or visual impact. Additionally, based on site-specific field investigation both the POI and Collection substation are not anticipated to have significant visual effect on nearby sensitive receptors. Therefore, visual screening is not anticipated to be necessary.

C. Relocation. Because of the limited number of suitable locations for turbines within the Facility site, and the variety of viewpoints from which the Facility can be seen, turbine relocation will generally not significantly alter visual impact. Moving individual turbines to less windy sites would not necessarily reduce impacts but could affect the productivity and viability of the Facility. Where visible from sensitive resources within the study area, views of the Facility are highly variable and include different turbines at different vantage points. Therefore, turbine relocation would generally not be effective in mitigating visual impacts. Additionally, the Facility layout has been designed to accommodate various set-backs from roads and residences. Options for relocation of individual Facility components are constrained by compliance with these setbacks.

D. Camouflage. The white/off white color of wind turbines (as mandated by the FAA to avoid daytime lighting) generally minimizes contrast with the sky under most conditions. This is demonstrated by simulations prepared under a variety of sky conditions. Consequently it is recommended that this color be utilized on the Cassadaga Wind Facility. The size and movement of the turbines prevents more extensive camouflage from being a viable mitigation alternative (i.e., the turbines cannot be made to look like anything else). Nielsen (1996) notes that efforts to camouflage or hide wind farms generally fail, while Stanton (1996) feels that such efforts are inappropriate. She believes that wind turbine siting "*is about honestly portraying a form in direct relation to its function and our culture; by compromising this relationship, a negative image of attempted camouflage can occur*." Other components of the Facility will be designed to minimize contrast with the existing agricultural character in the Facility area. For instance, new road construction will be minimized by utilizing existing farm lanes wherever possible and in most instances electrical collection lines will be buried.

E. Low Profile. A significant reduction in turbine height is not possible without significantly decreasing power generation. Less generating capacity (resulting from smaller turbines) could threaten the Facility's economic feasibility. To avoid generation losses, use of smaller turbines would require that additional turbines be constructed. Several studies have concluded that people tend to prefer fewer larger turbines to a greater number of smaller ones (Thayer and Freeman, 1987; van de Wardt and Staats, 1988). There will be minimal visual impact from the electrical collection system because the majority of the collection system will be installed underground, and where overhead sections are necessary, the poles will not exceed the height of the surrounding trees.

F. Downsizing. Reducing the number of turbines could reduce visual impact from certain viewpoints, but from most locations within the study area where more than one turbine is visible, the visual impact of the Facility would change only marginally. Additionally, the elimination of turbines could significantly reduce the socioeconomic benefits of the Facility and reduce the Facility's ability to assist the State in meeting its energy policy objectives and goals.

G. Alternate Technologies. Alternate technologies for comparable power generation, such as gas-fired or solar-powered facilities, would have different, and perhaps more significant, visual impacts than wind power. Viable alternative wind power technologies (e.g., vertical axis turbines), that could reduce visual impacts, do not currently exist in a form that could be used on a commercial/utility-scale Facility.

H. Non-specular Materials. Non-specular conductors will be considered for use on the proposed generator lead line, and the overhead portions of the electrical collection lines. Non-reflective paints and finishes will be used on the wind turbines to minimize reflected glare.

I. Lighting. The analyses presented herein are based on the conservative assumption that all turbines will be lit with FAA warning lights. However, turbine lighting will be kept to the minimum allowable by the FAA. Medium intensity red strobes will be used at night, rather than white strobes or steady burning red lights. Fixtures with a narrow beam path will be utilized as a means of minimizing the visibility/intensity of FAA warning lights at ground-level vantage points. Lighting at the substations will be kept to a minimum, and turned on only as needed, either by switch or motion detector. To avoid any lighting impacts on adjacent areas, full cut-off light fixtures will be utilized to the extent practicable (consistent with safety and security requirements).

J. Maintenance. The turbines and turbine sites will be maintained to ensure that they are clean, attractive, and operating efficiently. Research and anecdotal reports indicate that viewers find wind turbines more appealing when the rotors are turning (Pasqualetti et al., 2002; Stanton, 1996). In addition, the Facility developer will establish a decommissioning fund to ensure that if the Facility goes out of service and is not repowered/redeveloped, all visible above-ground components will be removed.

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

(11) Description of Visual Resources to be Affected

Visually sensitive resources of statewide significance were identified within the Facility study area. As defined in the DEC Visual Policy, these include any of the following types of resources:

- Properties listed on or determined eligible for listing on the National Register of Historic Places.
- State Parks.
- Urban Cultural Parks (or New York State designated Heritage Areas).
- The State Forest Preserve (i.e., the Adirondack or Catskill Parks).
- National Wildlife Refuges, State Game Refuges, and State Wildlife Management Areas.
- National Natural Landmarks.
- The National Park System, Recreation Areas, Seashores, or Forests.
- Rivers designated as National or State Wild, Scenic or Recreational Rivers.
- A site, areas, lake, reservoir, or highway designated or eligible for designation as scenic.
- Scenic Areas of Statewide Significance.
- A State or federally designated trail, or one proposed for designation.
- Adirondack Park Scenic Vistas.
- State Nature and Historic Preserve Areas.
- Palisade Park.
- Bond Act Properties purchased under Exceptional Scenic Beauty or Open Space category.

In addition, resources of local significance within the 5-mile study area were also be identified. These scenic areas include places of concentrated activity such as village centers and heavily used roadways, or landscapes of high aesthetic merit that may be considered important by local residents. See (b)(3) below for additional detail on visually sensitive resources.

(b) Viewshed Analysis

The Visual Impact Assessment includes identification of locations within the visual study area where it may be possible to view the proposed wind turbines and other proposed above ground facilities from ground-level vantage points. This analysis includes identifying potentially visible areas on viewshed maps. The methodology employed is described below.

(1) Viewshed Maps

Viewshed maps define the maximum area from which any turbine within the completed Facility could potentially be seen within the study area. Maps showing the results of viewshed analysis prepared based on the screening effect of topography alone, and the combined screening effect of mapped forest vegetation and topography were prepared. Viewshed analysis will be based on maximum blade tip height, FAA warning light height, and the height and location of proposed overhead transmission structures. These maps are presented on both USGS DEM Hillshade (Figure 24-7) and the most recent edition 1:24,000 scale topographic base map (Appendix A of the VIA). Additionally, results of the viewshed analysis are also shown on maps that also depict visually sensitive sites, viewpoint locations, and Landscape Similarity Zones (Appendix A of the VIA).

With respect to line of sight profiles, please note that the computer model program defines the viewshed (when evaluating topography only for instance) by reading every cell of the digital elevation model (DEM) data and assigning a value based upon the existence of a direct, unobstructed line of sight to turbine location/elevation coordinates from observation points throughout the entire visual study area. Therefore, for the purposes of this Article 10 Application, the viewshed analyses will serve to document the line of sight profiles for resources of statewide concern.

Potential turbine visibility, as indicated by the viewshed analyses, is illustrated in Figure 24-7 and summarized in Table 24-1. As indicated by blade tip viewshed analysis based only on topography, some portion of the proposed turbine array could potentially be visible in approximately 88.7% of the five-mile study area and approximately 65.2% of the ten-mile study area (Figure 24-7, Sheet 1; Table 24-1). This "worst case" assessment of potential visibility indicates the area where any portion of any turbine could potentially be seen, without considering the screening effect of existing vegetation and structures. Areas where there is no possibility of seeing the turbine array include locations in narrow ravines and on hillsides oriented away from the Facility site. These are concentrated in the outer portions of the study area, such as along the vicinity of Chautauqua Lake to the southwest of the Facility and the slopes to the east of Fredonia oriented toward Lake Erie in the northern portion of the study area. Based solely on the results of topographic viewshed analysis, areas with potential views of the turbines occur throughout the 10-mile study area, and more than half of the proposed turbines have the potential to be visible in the majority of this area. As indicated in Appendix C of the VIA, 161 of the 191 identified aesthetic resources of statewide significance within the 10-mile study area theoretically could have views of some portion of the Facility (based on maximum blade tip height and screening provided by topography alone).

Areas of potential nighttime visibility, as indicated by the FAA topographic viewshed analysis (Figure 24-7, Sheet 2; Table 24-1) include approximately 85.1% of the five-mile radius study area and approximately 59.8% of the ten-mile radius study area. This analysis indicates that the potential visibility of FAA warning lights at a height of 325 feet (99 meters) will generally be concentrated in the same areas where daytime blade-tip height visibility was indicated. As stated above, this topographic analysis presents a "worst case" assessment of potential nighttime visibility that does not take into account the screening effect of existing vegetation and structures, and is based on the conservative assumption that all turbines could be equipped with FAA warning lights (a more realistic assumption is that approximately half of the turbines will be lighted).

Factoring vegetation into the viewshed analysis significantly reduces potential Facility visibility (Figure 24-7, Sheets 3 and 4). Within the five-mile study area, vegetation, in combination with topography, will serve to block daytime views of the Facility from approximately 66.6% of the five-mile study area and approximately 78.3% of the ten-mile study area (i.e., 41.4% and 21.7% of the study areas, respectively, is indicated as having potential Facility visibility). Areas of potential nighttime visibility, as indicated by FAA vegetation viewshed analysis, are limited to approximately 30.8% of the five-mile radius study area and approximately 19.4% of the ten-mile radius study area. Based on the results of the viewshed analysis, visibility will generally be most available in open agricultural areas and along significant portions of NYS Routes 83, 322, and US Route 62 within the study area. Visibility is also indicated in most portions of the Village of Cassadaga, Fredonia, South Dayton, Sinclairville, and Cherry Creek. However, buildings and street trees, which are not accounted for in this analysis, will likely screen many of those views. State forests and other forested areas in the central portion of the study area fall mostly outside the vegetation viewshed, as do wooded slopes and the backsides of hills throughout the study area. Factoring vegetation in the viewshed analysis substantially reduces the area of potential Facility visibility throughout the study area. However, because they are primarily located in agricultural or village settings, factoring mapped forest vegetation into the viewshed analysis does not indicate reduced Facility visibility at many of the aesthetic resources of statewide significance within the study area (see Appendix C of the VIA). As mentioned previously, areas of actual visibility are anticipated to be more limited than indicated by the vegetation viewshed analysis, due to the slender profile of the turbines, the effects of distance, and screening from hedgerows, street trees and structures, which are not considered in the analysis.

An analysis comparing potential daytime Facility visibility within the different LSZs is presented in Table 24-2 (below) and indicates that the screening effects of topography and forest vegetation are highly variable between the different zones and result in vastly different levels of potential visibility.

Table 24-1. Summary of Viewshed Results for Five-Mile and Ten-mile Study Areas

Number of Turbines Visible	Blade Tip Topography Only		Blade Tip Topography and Vegetation		FAA/Nacelle Topography Only		FAA/Nacelle Topography and Vegetation	
	Square Miles	% of Study Area	Square Miles	% of Study Area	Square Miles	% of Study Area	Square Miles	% of Study Area
Five-Mile-Radius Study Area[1] Viewshed Results								
0	26.8	11.3	157.6	66.6	35.3	14.9	163.7	69.2
1-12	35.0	14.8	29.0	12.2	47.1	19.9	33.6	14.1
13-24	46.8	19.8	21.5	9.1	59.0	24.9	22.6	9.5
25-36	61.5	26.0	19.5	8.2	61.1	25.8	14.1	5.7
37-48	38.5	16.3	7.2	3.0	21.8	9.2	2.5	1.3
49-62	28.0	11.8	1.8	0.8	12.4	5.2	0.2	<0.1
Total Visible	209.8	88.7	79.0	41.4	201.4	85.1	73.0	30.8
Ten-Mile-Radius Study Area[2] Viewshed Results								
0	209.0	34.8	470.2	78.3	241.4	40.2	484.0	80.6
1-12	78.5	13.1	46.8	7.8	88.6	14.8	50.0	8.2
13-24	73.5	12.2	31.2	5.2	82.2	13.7	31.4	5.3
25-36	89.1	14.8	30.1	5.0	93.1	15.5	25.5	4.3
37-48	70.9	11.8	16.4	2.7	71.1	11.8	9.0	1.5
49-58	79.3	13.2	5.5	0.9	24.0	4.0	0.4	<0.1
Total Visible	391.3	65.2	130	21.7	359	59.8	116.3	19.4

[1]The 5-mile study area includes approximately 236.6 square miles, or approximately 151,420 acres.
[2] The 10-mile study area includes approximately 600.4 square miles, or approximately 384,260 acres.

Table 24-2. Blade Tip Vegetation Viewshed Results by Landscape Similarity Zone, Ten-Mile Study Area

Number of Turbines Visible	Ten-Mile-Radius Study Area[1] Viewshed Results by Landscape Similarity Zone (LSZ) (% of LSZ w/ Potential Facility Visibility)					
	Forest[2]	Waterfront/ Open Water	Transportation Corridor	Rural Valley	Rural Uplands/ Ridgelines	Village/ Hamlet
0	100.0	87.5	70.6	57	58.0	61.5
1-12	0	3.1	18.9	13.3	16.3	17.6
13-24	0	2.7	8.4	10	9.9	12.6
25-36	0	3.5	1.8	13.5	6.3	4.3
37-48	0	3.2	0.4	5.7	5.4	3.6
49-62	0	<0.1	0.0	0.5	4.1	0.4
Total Percent Visible	0.0%	12.5%	29.5%	43.0%	41.0%	38.5%

[1]The viewshed analysis area (within 10-miles of proposed wind turbines) includes approximately 600.4 square miles, or approximately 384,260 acres.
[2]The viewshed analysis methodology concludes that there is no visibility in Forested areas as an assumption of the model. However, it is possible that areas classified as forest, especially on the edges, will have small areas of visibility (See Section 4.1.1 of the VIA).

Potential visibility of the Facility (based on viewshed analysis) from the various LSZs within the study area is summarized as follows:

- The LSZ with the least amount of potential Facility visibility is Forest, which essentially offers no outward visibility due to the screening effects of the forest canopy. Note that small portions of the Forest LSZ may, in reality, offer limited outward views due to categorization errors by the USGS when classifying land-cover as Forested with a 30-meter x 30-meter cell resolution, especially at the edges of forested areas. These digital data do not recognize small clearings or other breaks in the vegetation that may allow for occasional outward views from forest areas. However, the occurrence of these areas is generally limited, and there will be little to no Facility visibility from forested areas, especially during the growing season.
- The Waterfront/Open Water LSZ only has potential views of the Facility in 12.5% of its area within the 10-mile study area. Waterfront/Open Water areas often provide opportunities for distant views due to the lack of screening by foreground vegetation and topography. However, within the 10-mile study area for this Facility, most of the waterbodies are small, and often surrounded by tall forest vegetation. Therefore, the water surface does not cover a large enough area to provide obstruction-free view corridors toward the Facility Site. The largest waterbody in the study area is Chautauqua Lake. However, despite its size, outward views toward the Facility from the surface of this lake are almost entirely screened by intervening topography.
- The Transportation Corridor LSZ presents potential opportunities for Facility visibility in 29.5% of its area within the 10-mile study area. This LSZ includes the NYS Route 60 corridor running north/south through the center of

the Facility Site, along with the corridors of Interstate Routes 90 and 86, both of which are located further than five miles from the Facility. Although intervening topography and vegetation provide screening in some areas, open views are available from portions of the Interstates. However, in all cases, these views will be distant and fleeting. The NYS Route 60 corridor within the study area runs through village/hamlet areas as well as agricultural areas, rising along ridges and dipping into valleys. Opportunities for turbine visibility increase in areas closer to the Facility and along ridgelines in the more rural, and unforested portions of the study area.

- The more populated portions of the study area that make up the Village/Hamlet LSZ offer potential Facility visibility in 38.5% of their acreage. However, as mentioned above, it is likely that this greatly overstates the opportunities for Facility visibility in this LSZ, as the buildings and associated vegetation clusters that typify village and hamlet centers will provide a great deal of screening that isn't accounted for in the viewshed analysis.
- The greatest potential for visibility of the turbines is indicated within the Rural Valley and Rural Upland/Ridgeline LSZs. The blade-tip vegetation viewshed indicates that 43.0% and 41.0% of the acreage within these zones will potentially offer views of the Facility, respectively. Views from the Rural Valley zone are affected by screening by both topography and vegetation. On the other hand, screening by vegetation is more influential in the Rural Upland/Ridgeline LSZ, as higher elevations generally reduce or eliminate the screening effects of intervening topography. However, as the viewshed analysis indicates, the Facility is screened by topography and/or vegetation in the majority of areas within each of these zones.

Potential generator lead visibility, as indicated by the viewshed analyses, is illustrated in Figure 24-7: Sheets 5 and 6. As indicated by pole height viewshed analysis based only on topography, some portion of the proposed structures for the 115kv line could potentially be visible in approximately 16.7% of the ten-mile study area (Figure 24-7, Sheet 5). This "worst case" assessment of potential visibility indicates the area where any portion of any pole could potentially be seen, without considering the screening effect of existing vegetation and structures. Areas where there is no possibility of seeing the proposed generator leads include locations in narrow ravines and on hillsides oriented away from the alignment of the line. These areas include the majority of areas in the eastern and northern portions of the study area.

Factoring vegetation into the viewshed analysis significantly reduces potential generator lead visibility (Figure 24-7, Sheet 6). Vegetation, in combination with topography, will serve to block views of the proposed generator lead from approximately 96.3% of the ten-mile study (i.e., 3.7% is indicated as having potential Facility visibility). Based on the results of the viewshed analysis, visibility will generally be most available in open agricultural areas along the proposed generator lead corridor, in the areas surrounding the Villages of Cassadaga and Sinclairville in the southwestern portion of the study area. Visibility is also indicated in portions of the Village of Cassadaga, and Sinclairville, however buildings and street trees, which are not accounted for in this analysis, will likely screen most of those views.

(2) Viewshed Methodology

Topographic viewshed maps for the Facility were prepared using 10-meter resolution USGS digital elevation model (DEM) data (7.5-minute series) for the visual study area, the location and height of all proposed turbines (see Figure 24-6), an assumed viewer height of 1.7 meters, and ESRI ArcGIS® software with the Spatial Analyst extension. Two ten-mile radius topographic viewsheds were mapped, one to illustrate “worst case” daytime visibility (based on a maximum blade tip height of 500 feet, or 152.4 meters, above existing grade) and the other to illustrate potential visibility of turbine lights (based on an assumed height for the lights on top of the nacelle of 325 feet, or 99 meters, above existing grade).

The ArcGIS program defines the viewshed by reading every cell of the DEM data and assigning a value based upon the existence of a direct, unobstructed line of sight to proposed facility location/elevation coordinates from observation points throughout the ten-mile study area. The resulting viewshed maps define the maximum area from which any portion of any turbine in the completed Facility could potentially be seen within the study area during both daytime and nighttime hours based on a direct line of sight, and ignoring the screening effects of existing vegetation and structures. A turbine count analysis was also performed to determine how many wind turbines are potentially visible from any given point within the viewshed. The results of this analysis were then grouped by number of turbines potentially visible and presented on a viewshed map.

Because the screening provided by vegetation and structures is not considered in this analysis, the topographic viewshed represents a true "worst case" assessment of potential Facility visibility. Topographic viewshed maps assume that no trees exist, and therefore are very accurate in predicting where visibility will not occur due to topographic interference. However, they are less accurate in identifying areas from which the Facility could actually be visible. Trees and buildings can limit or eliminate visibility in areas indicated as having potential Facility visibility in the topographic viewshed analysis.

To supplement the topographic viewshed analysis, a vegetation viewshed was also prepared to illustrate the potential screening provided by forest vegetation. A base vegetation layer was created using the 2011 USGS National Land Cover Dataset (NLCD) to identify the mapped location of forest land (including the Deciduous Forest, Evergreen Forest, Mixed Forest and Woody Wetland NLCD classifications) within the visual study area. Based on standard visual assessment practice, the mapped locations of the forest land were assigned an assumed height of 40 feet and added to the DEM. The viewshed analysis was then re-run, as described above. As with the topographic viewshed analysis, two vegetation viewsheds were mapped, one to illustrate "worst case" daytime visibility (based on a maximum blade tip height of approximately 500 feet above existing grade) and the other to illustrate potential visibility of turbine lights (based on a nacelle height of approximately 325 feet above existing grade and the conservative assumption that all turbines could be equipped with FAA warning lights). Once the initial vegetation viewshed analysis was completed, a Spatial Analyst conditional statement was used to assign zero visibility to all areas of mapped forest, resulting in the final vegetation viewshed. The vegetation viewshed is based on the assumption that in most forested areas, outward views will be well screened by the overhead tree canopy. During the growing season the forest canopy will fully block views of the proposed turbines, and such views will typically be almost completely obscured, or at least significantly screened by tree trunks and branches, even under "leaf-off" conditions. Although there are certainly areas of mapped forest that have natural or man-made clearings that could provide open outward views, these openings are rare, and the available views would typically be narrow/enclosed and include little of the proposed Facility.

Because it accounts for the screening provided by mapped forest stands, the vegetation viewshed is a much more accurate representation of potential Facility visibility. However, it is important to note that because screening provided by buildings and street/yard trees, as well as characteristics of the proposed turbines that influence visibility (color, narrow profile, distance from viewer, etc.), are not taken consideration in the viewshed analyses, being within the viewshed does not necessarily equate to actual Facility visibility.

Per the requirements set forth in 16 NYCRR § 1000.24(a), the potential cumulative visual effect of the Cassadaga Wind Facility as well as other wind energy projects proposed in the surrounding region must be considered. Cumulative impacts are two or more individual environmental effects which, when taken together, are significant or that compound or increase other environmental effects. The individual effects may be effects resulting from a single project or from separate projects. This section addresses the potential cumulative visual impacts that may arise from interactions between the impacts of the proposed Cassadaga Wind Facility and the impacts of other wind projects in Chautauqua County. Across New York State, numerous wind-powered generating facilities are either in operation, or in the project planning and development phases. The closest operational projects are the Sun Edison (formerly First Wind) Steel Winds Project and the Noble Bliss Wind Park, located approximately 36 miles and 47 miles from the Cassadaga Wind Facility, respectively. These operating projects are too distant to pose the potential for significant adverse cumulative impacts. The review and approval status of proposed wind projects in the area is highly variable, ranging from preliminary site investigations to those with completed system reliability impact studies (a requirement of the New York Independent System Operator, or NYISO), detailed project plans, and landowner agreements.

The NYISO oversees the New York Transmission System (the "Grid") and has in place a process for permitting the interconnection of new electric generating facilities with the Grid. Consequently, consideration of a project's status in the NYISO review process is a helpful measure for determining whether a proposed project may or may not be built. The NYISO reviews projects in three main phases: 1) submittal of an interconnection request, 2) preparation of a feasibility study, and 3) completion of a system reliability impact study. This review process separates projects by feasibility to connect to the Grid through a selected transmission facility. Proposed projects in any phase of project review by the NYISO are identified on a comprehensive queue listing maintained by NYISO (NYISO, 2016). It is reasonable to assume that wind power projects with in-progress system reliability impact studies and with upcoming proposed operation dates may be considered 'proposed' or 'future' projects for the purposes of cumulative impact analysis.

There are two other proposed wind projects listed in the NYISO queue located in Chautauqua County: the proposed Arkwright Summit and Ball Hill Wind Farms (NYISO, 2016). The Arkwright Summit Wind Farm is a proposed 36-turbine, 78 MW wind energy facility located approximately two miles north of the Cassadaga Wind Facility Site in the Town of Arkwright. The proposed Ball Hill Wind Farm is a proposed 36-turbine, 79-100 MW wind energy facility located approximately three miles northeast of the Cassadaga Wind Facility Site in the Towns of Hanover and Villenova. According to its Final Environmental Impact Statement (FEIS), the Arkwright Summit Wind Project is scheduled to commence construction in the summer of 2016. According to its Supplemental Draft Environmental Impact Statement (SDEIS), the Ball Hill Wind Project is anticipated to commence construction in 2017, with completion in 2018. For the purposes of cumulative visual impact analysis, it is assumed that all three projects will eventually be operational.

Table 24-3. Cumulative Viewshed Results

Facility Combination	Total Area of Potential Cumulative Visibility within the 10-Mile Study Area (square miles)	Total Area of Potential Cumulative Visibility[1] within 10-Mile Study Area (% of Study Area)
Cassadaga and Arkwright	54.0	9.0%
Cassadaga and Ball Hill	56.2	9.4%
Cassadaga, Ball Hill, and Arkwright	33.0	5.5%

[1]The 10-mile study area includes approximately 600.4 square miles, or approximately 384,260 acres.

To evaluate the potential cumulative visual impact of multiple wind power projects, cumulative viewshed analyses were prepared. The 10-mile radius vegetation viewshed analysis for the Cassadaga Wind Facility (based on maximum blade tip height) were overlaid on viewshed analyses prepared using the same methodology described herein for the proposed Arkwright Summit and Ball Hill Wind Facilities (based on publically available layout data included in each

Facility's respective State Environmental Quality Review Act [SEQRA] documentation). The viewsheds for the three projects were then plotted on a base map, and areas of viewshed overlap identified. The cumulative viewshed analysis of the proposed Cassadaga, Arkwright Summit, and Ball Hill Wind Farms is presented in Figure 24-13 and Table 24-3.

Areas within the 10-mile study area indicated as having potential views of all three projects on the cumulative viewshed map (Figure 24-13) are limited primarily to open field areas located along NYS Route 83 and on the eastern slopes and valley floor of the Conewango Creek valley (east of the Cassadaga Facility site). Additionally, some large areas within with Village of Fredonia (where there is no mapped forest vegetation) are indicated as having potential visibility of all three projects. However, buildings and street/yard trees (which are not accounted for in the viewshed analysis) will likely screen much of this visibility. Such views could also be available in elevated areas within or adjacent to each project site on ridgetops where panoramic views of nearby ridges are available, such as adjacent to the intersection of Cassadaga and Rood Roads (south of the hamlet of Griswold), east of the intersection of Palmer Road and Center Road (west of the hamlet of Chicken Tavern Corners), and in the vicinity of Pope Hill and Round Top Roads in the Town of Villenova. Areas of potential cumulative visibility of all three projects amount to approximately 5.5% of the 10-mile study area (Table 24-3).

As described in Section 5.1, 5.2, and 5.3 of the VIA, the visibility and visual effect of the Facility will be highly variable based on viewing distance, viewer orientation, and the number of turbines visible, as well as the potential screening effects of topography and vegetation. If turbines from the Arkwright Summit or Ball Hill Facilities are visible from a vantage point within the Cassadaga Wind Facility Site, they will typically be background features in any foreground or mid-ground view that includes the Cassadaga turbines. From larger distances, the three Facilities may appear to be a single larger Facility. However, the visual effect of all three Facilities at longer distances (i.e., greater than 5 miles) will be relatively minimal due to the effects of distance.

(3) Sensitive Viewing Areas

In accordance with standard visual impact assessment practice in New York State, visually sensitive resources were identified in accordance with the New York State Department of Environmental Conservation (NYSDEC) Program Policy DEP-00-2 Assessing and Mitigating Visual Impacts (NYSDEC, 2000), which define specific types of properties as visually sensitive resources of statewide significance. The types of resources identified by NYSDEC in Program Policy DEP-00-2 are consistent with the types of resources identified in 16 NYCRR § 1000.24(b)(4) and include landmark landscapes; wild, scenic or recreational rivers administered respectively by either the DEC or the APA pursuant to ECL Article 15 or Department of Interior pursuant to 16 USC Section 1271; forest preserve lands, scenic vistas specifically identified in the Adirondack Park State Land Master Plan, conservation easement lands, scenic byways designated by the federal or state governments; Scenic districts and scenic roads, designated by the Commissioner of Environmental Conservation pursuant to ECL Article 49 scenic districts; Scenic Areas of Statewide Significance; state parks or historic sites; sites listed on National or State Registers of Historic Places; areas covered by scenic easements, public parks or recreation areas; locally designated historic or scenic districts and scenic overlooks; and high-use public areas.

To identify visually sensitive resources within the visual study area, EDR consulted a variety of data sources including digital geospatial data (shapefiles) obtained primarily through the NYS GIS Clearinghouse or the Environmental Systems Research Institute (ESRI); numerous national, state, county and local agency/program websites as well as websites specific to identified resources; the DeLorme Atlas and Gazetteer for New York State; USGS 7.5-minute topographical maps; and web mapping services such as Google Maps. Aesthetic resources of statewide significance were identified within 10 miles of the Proposed Facility, and locally significant aesthetic resources and areas of intensive land use were identified within five miles of the proposed Facility. The inventory of resources is presented in Appendix C of the VIA. The location of visually sensitive resources within the visual study area is illustrated in Figure 24-4, and on the viewshed/sensitive site maps included in Appendix A of the VIA.

In addition, per the requirements set forth in 16 NYCRR § 1000.24(b)(4) as well as the Public Scoping Statement (PSS) for the Facility, the Applicant conducted a systematic program of public outreach to assist in the identification of visually sensitive resources. Copies of the correspondence sent by the Applicant as part of this process, as well as responses received from stakeholders, are included as Appendix F of the VIA. This outreach included the following:

- On April 1, 2015, in accordance with Article 10, Exhibit 24, Part 1001.24(b)(4), the Applicant distributed a request to appropriate agency personnel and municipal representatives (EDR, 2015a; see Appendix F of the VIA) that requested feedback regarding the identification of important aesthetic resources and/or representative viewpoints in the Facility vicinity to inform field review efforts and the eventual selection of candidate viewpoints for the development of visual simulations. The materials provided as part of this submission to interested stakeholders included: a summary of the purpose and necessity of consultation per the requirements of Article 10; a definition, explanation, and map of the visual study area; a preliminary inventory and map of visually sensitive resources identified in accordance with the NYSDEC Program Policy DEP-00-2 *Assessing and Mitigating Visual Impacts* (NYSDEC, 2000); a preliminary viewshed (visibility) analysis; a discussion of anticipated subsequent steps, including additional consultation regarding the eventual selection of viewpoints for development of visual simulations; and, a request for feedback regarding additional visually sensitive resources to be included in the analysis.

- On May 5, 2015, EDR staff spoke with Mark Geise, formerly Deputy Director of the Chautauqua County Department of Planning & Economic Development. Mr. Geise recommended that EDR review the Chautauqua County Greenway Trail Plan and the County Planning Department website (www.planningchautauqua.com). Specific sites/resources identified by Mr. Geise included a 35-mile equestrian trail network currently under development, the Cockaigne Ski Center, a snowmobile trail, and Camp Onyahsa (a YMCA summer camp on Lake Chautauqua). These sites are included in the inventory of visually sensitive sites included in Appendix C of the VIA.
- On May 6, 2015, EDR provided preliminary visual analysis information to Diana Carter, Director of Planning for New York State Office of Parks, Recreation, and Historic Preservation (NYSOPRHP), which included results of a preliminary viewshed analysis and an assessment of the Facility's potential visual effect on State Parks. The results of the preliminary analysis provided to Ms. Carter indicated the following with respect to State Parks (EDR, 2015b):

  - From Midway Park, the Facility will be fully screened from view by intervening topography.
  - From Long Point State Park, the Facility will be fully screened from view by intervening topography.
  - From Lake Erie State Park, the proposed turbines may be visible from some locations. However, due to the slender profile of the turbines and the effects of distance (the nearest turbine in the proposed layout is 10.4 miles from the park boundary), it is not anticipated that the Facility would have a significant visual effect. Because the park is located so far from the Facility, Lake Erie State Park may ultimately fall outside of the visual study area as it is refined.

- On May 8, 2015, Diana Carter, Director of Planning for NYSOPRHP, provided a response to the Applicant's May 6, 2015 preliminary analysis. NYSOPRHP's response stated: "*I received the hardcopy of the letter/study that you attached to your email. With your assurance that this information will be included and refined in Exhibit 24 of the Article 10 application, it will demonstrate how our resources will not be adversely impacted by the visual effects of the project's wind turbines. Upon my review of the materials, OPRHP is satisfied and concurs with this analysis. We will have no further concerns regarding visual impacts to state park resources. As you note below you will still be required to continue your consultation with the State Historic Preservation Office regarding Cultural Resource impacts*" (NYSOPRHP, 2015a).
- On June 1, 2015, EDR received a response from the Town of Cherry Creek Historian which provided maps and noted the locations of regional snowmobile trails, equestrian trails, and the New York Amish Trail driving route. In addition, the Town Historian provided information on local historic sites. These sites are included in the inventory of visually sensitive sites included in Appendix C of the VIA.
- On July 1, 2015, the Applicant received verbal confirmation from the Town Board of the Town of Charlotte that they were not aware of any additional sensitive sites that should be included in the analysis (i.e., beyond those already identified by EDR).
- In their comments on the PSS provided on October 5, 2016, Department of Public Service (DPS) staff identified six general areas of concern to be addressed in the VIA, as follows:

    - Any overlook locations from recreational trails or trailheads in/between the Boutwell Hill State Forest and Canadaway Creek Wildlife Management Areas.
    - Easterly view from the New York State Department of Transportation (NYSDOT) James A. France Memorial Rest Area on NYS Route 60 near the Stockton-Charlotte Town boundary north of Roberts Road.
    - Any open areas with predicted Facility visibility from the Chautauqua Institution in the Town of Chautauqua.
    - A Farm complex ca. 1920, located on NYS Route 83 near Pine Valley Central Schools.
    - Open views from Villages of Sinclairville, Cherry Creek, and Cassadaga; and
    - Cockaigne Ski Resort.

- In addition, EDR conducted a historic resources survey (in consultation with the NYSOPRHP) of the five-mile study area to identify potential historic sites (EDR, 2015c, 2016a), which were included in the inventory of visually sensitive resources. Preliminary results of the historic resources survey (including a map and photos of identified resources) were provided to NYOPRHP on February 16, 2016. The results of this survey are presented in a final report that is included as an appendix to the Article 10 Application.

- All of the visually sensitive sites that were identified as a result of research, stakeholder outreach, and subsequent consultation are included in Appendix C of the VIA, and further described below.

The Facility's 10-mile visual study area includes 20 sites that the NYSDEC Program Policy DEP-00-2 Assessing and Mitigating Visual Impacts (NYSDEC, 2000) considers aesthetic resources of statewide significance (see Appendix C of the VIA). These consist of five sites and four districts listed on the National Register of Historic Places (NRHP); three state parks; one state heritage area; five state wildlife management areas; one eligible wild, scenic or recreational river; and one regionally significant water body. Additionally, the area within five miles of the proposed Facility includes 187 sites that are eligible for NRHP-listing. These resources are described in detail Section 3.6.1 of the VIA.

In addition, the Chautauqua Institution, a NRHP-listed Historic District and National Historic Landmark, is located just on the limits of the visual study area (approximately 10.7 miles from the nearest turbine). However, the Chautauqua Institution is included in the VIA in recognition of its status as a National Historic Landmark and due to its importance as a regional cultural center (per feedback received as part of stakeholder consultation, as described above).

In addition to the scenic resources of statewide significance listed above, the visual study area also includes areas that are regionally or locally significant, sensitive to visual impacts, and/or receive significant public/recreational use. The area within five miles of the proposed Facility includes locally significant aesthetic resources such as recreation facilities, public open spaces, population centers, and heavily used transportation corridors. These resources are described in detail in Section 3.6.2 of the VIA and also listed in Appendix C of the VIA.

(4) Viewpoint Selection

16 NYCRR § 1000.24(b)(4) includes the requirements that "*the applicant shall confer with municipal planning representatives, DPS, DEC, OPRHP, and where appropriate, APA in its selection of important or representative viewpoints*"[2]. Building on the consultation with municipal representatives and stakeholders to identify visually sensitive sites (as described above in Section (b)(3) of this Exhibit and in Section 3.6 of the VIA), the Applicant

[2] Note: "DPS" is the New York State Department of Public Service, "DEC" is the New York State Department of Environmental Conservation, "OPRHP" is the New York State Office of Parks, Recreation, and Historic Preservation, and "APA" is the Adirondack Park Agency. The APA is not applicable in this instance due to the Facility's location (i.e., not in the vicinity of the Adirondack Park).

conducted additional outreach to agency staff and stakeholder groups to determine an appropriate set of viewpoints for the development of visual simulations. Copies of the correspondence sent by the Applicant as part of this process, as well as responses received from stakeholders, is included as Appendix F of the VIA. This outreach included:

- On February 8, 2016, in accordance with Article 10, Exhibit 24, Part 1001.24(b)(4), the Applicant's visual consultant distributed a memorandum entitled "Cassadaga Wind Facility – Recommendations for Visual Simulations" (EDR, 2016b) to the same agencies and stakeholders that were previously engaged to identify visually sensitive resources (see Appendix F of the VIA). This memo included: a summary of research and consultation undertaken as part of the VIA to date; description of the field review/photography for the Facility; a rationale for viewpoint selection; and, recommendations for 19 viewpoints to be considered by agencies and stakeholders from which the Applicant proposed that 12 viewpoints be selected for the preparation of visual simulations. The rationale provided for viewpoint selection included the following factors:

    - Providing representative views from the various LSZs and Distance Zones within the study area.
    - The locations of visually sensitive resources/sites within the study area, including recommendations for sensitive sites received from DPS and other stakeholders during review of the Facility's Preliminary Scoping Statement (PSS).
    - The predicted visibility of the Facility based on viewshed analysis.
    - The availability of open views towards the proposed Facility as determined by field review/site visits.

- On February 10, 2016, EDR consulted with DPS staff to review the February 8 memo. As part of this discussion, it was agreed that an on-line meeting (i.e., utilizing shared computer screens) would be an effective way for stakeholders to review and respond to the viewpoint recommendations. It was agreed that the Applicant would facilitate a conference call and on-line meeting with stakeholders on February 18, 2016.
- On February 11, 2016, the Applicant's visual consultant had a discussion with NYSOPRHP staff to review the memo provided by the Applicant on February 8 and describe the content and format of the proposed stakeholder conference call/on-line meeting on February 18.
- On February 16, 2016, EDR provided to NYSOPRHP a map and photos that served as preliminary results of the historic resources survey conducted for the Facility's 5-mile study area, to provide further information for their consideration in selection of viewpoints for visual simulations.
- On February 18, 2016, EDR hosted two on-line meetings, which included a conference call and link to EDR's computer screen. The two meetings were held at 10:00 A.M. and 4:00 P.M. (to accommodate participants' schedules and maximize participation); however, the format and content of each meeting were identical. Each

meeting included: a review of the visual studies conducted to date; discussion of proposed and alternate viewpoints for use as simulations; and, the Applicant requested that stakeholders provide any additional suggestions or comments re: viewpoint selection via email (none were received).

- As a follow-up to the on-line meetings, EDR provided a proposed list of viewpoints for visual simulations to DPS staff via email on February 19, 2016. Following additional emails to clarify minor items, DPS indicated concurrence with a proposed list of visual simulations for inclusion in the VIA.

Based on the outcome of stakeholder and agency consultation, 14 viewpoints were selected for the development of visual simulations. These viewpoints were selected based upon the following criteria:

1. They provide open views of proposed turbines (as indicated by field verification), or provide representative views of the screening effects of vegetation and/or buildings from selected areas.
2. They illustrate Facility visibility from sensitive resources with the visual study area identified by local stakeholders and state agencies.
3. They illustrate typical views from LSZs where views of the Facility will be available.
4. They illustrate typical views of the proposed Facility that will be available to representative viewer/user groups within the visual study area.
5. They illustrate typical views of different numbers of turbines, from a variety of viewer distances, and under different lighting conditions, to illustrate the range of visual change that will occur with the Facility in place.
6. The photos obtained from the viewpoints display good composition, lighting, and exposure.

Locational details and the criteria for selection of each simulation viewpoint are summarized in Table 24-4, below:

Table 24-4. Viewpoints Selected for Simulation

Viewpoint Number	Location and/or Visually Sensitive Resource	LSZ Represented	Viewer Group Represented	Viewing Distance[1]	View Orientation[2]
9	Snowmobile Trail, crossing at County Route 85	Rural Valley	Residents, Tourists/Recreational Users	0.7	ESE to SSE
47	Farm Complex (c.1920) (NRHP-Eligible), 8025 NYS Route 83	Rural Valley	Residents, Through-Travelers/Commuters	2.2	SW
49	Village Park, NYS Route 83	Village/Hamlet	Residents, Tourists/Recreational Users	1.6	NW
55	Plank Road	Rural Uplands/Ridgeline	Residents	0.2	ESE to SSE
77	County Route 380, west of Hamlet of South Stockton	Rural Uplands/Ridgelines	Residents	3.7	NE
88	Village Green, County Route 102	Village/Hamlet	Residents	1.3	NNW
97	Harper Road	Rural Valley	Residents	1.1	W
114	Interstate 86, Exit 15	Transportation Corridor	, Through-Travelers/Commuters	8.8	NNW
116	New York Amish Trail and Conewango Swamp Wildlife Management Area, NYS Route 241	Rural Valley	Residents, Tourists/Recreational Users	10.1	NW
128	County Route 71, south of County Route 58	Rural Valley	Residents	4.0	ENE
132	Cassadaga Lake, Dale Drive	Waterfront/Open Water	Residents, Tourists/Recreational Users	3.7	E
140	New York's Amish Trail, Youngs Road	Rural Uplands/Ridgelines	Residents	4.7	WNW
149	Cook Road, near Boutwell State Forest	Rural Uplands/Ridgelines	Residents	0.4	SSE to SW
165	North Hill Road, south of Villenova Road	Rural Uplands/Ridgelines	Residents	2.6	S

[1]Distance from viewpoint to nearest visible turbine (in miles)
[2]N = North, S = South, E = East, W = West

(5) Photographic Simulations

In order to show anticipated visual changes associated with the Facility in this Article 10 Application, high-resolution computer-enhanced image processing was used to create photo-realistic simulations of the completed turbines and other visible Facility infrastructure from each of the selected viewpoints. As indicated in (b)(4) above, viewpoints were selected, in part, for their open views and as such there will be no significant screening of the proposed Facility due to vegetation in the photographic simulations. Therefore, it is not anticipated that both leaf-on and leaf-off simulations were not be prepared. As previously mentioned representative viewpoints were selected based upon the feedback provided by municipal planning representatives, DPS, DEC and OPRHP; while also considering the other factors stated above. The photographic simulations are presented in Figure 24-10 of this Exhibit and Appendix D of the VIA.

(6) Additional Simulations Illustrating Mitigation

Due do the typical height of individual turbines and the geographic extent of a given wind power project, mitigation measures such as screening of individual turbines with earthen berms, fences, or planted vegetation will generally not be effective in reducing visibility. Therefore, additional simulations specific to mitigation were not prepared.

(7) Simulation Rating and Assessment of Visual Impact

As described in Section 4.2.3 of this VIA, three (two in-house, one independent) registered landscape architects (LAs) evaluated the visual impact of the proposed Facility. Utilizing 11 x 17-inch digital color prints of the 14 selected viewpoints described above (see Table 24-4), the LAs reviewed the existing and proposed views, evaluated the contrast/compatibility of the Facility with various components of the landscape (landform, vegetation, land use, water, sky, land use and viewer activity), and assigned quantitative visual contrast ratings on a scale of 0 (insignificant) to 4 (strong). The average contrast score assigned by each LA was calculated for each viewpoint, and an average score for each, viewpoint was determined. Copies of the rating forms used on this project are included in Appendix E of the VIA. Digital files containing additional context photos taken at each viewpoint were also made available to the panel. The methodology for the rating panel exercise is described in detail above in Section (a)(8).

The average score of the landscape components evaluated by each LA was calculated for each viewpoint. The results of this process are summarized below in Table 24-5.

Table 24-5. Summary of Results of Contrast Rating Panel Review of Simulations

VP #	Distance to Nearest Turbine	Distance Zone	Landscape Similarity Zone	Viewer Groups			Contrast Rating Scores [1]			
				Residents	Travelers	Recreational	#1	#2	#3	Average
9	0.7 mile	Mid-ground	Rural Valley	X	X	X	2.3	2.6	3.4	2.8
47	2.0 miles	Mid-ground	Rural Valley	X	X		0.8	0.9	1.2	1.0
49	1.6 miles	Mid-ground	Village/Hamlet	X	X	X	0.8	1.6	0.9	1.1
55	0.2 mile	Foreground	Rural Uplands/ Ridgeline	X	X		3	2.7	3.4	3.0
77	3.7 miles	Background	Rural Uplands/ Ridgelines	X			3.4	2.9	2.9	3.1
88	1.3 miles	Mid-ground	Village/Hamlet	X	X	X	1.2	1.3	0.3	0.9
97	1.1 miles	Mid-ground	Rural Valley	X	X		0.7	2.7	3.4	2.3
114	8.8 miles	Background	Transportation Corridor		X		0.5	0.6	0.1	0.4
116	10.1 miles	Background	Rural Valley		X	X	1.7	1.3	1.2	1.4
128	2.9 miles	Mid-ground	Rural Valley	X	X		1.0	2.6	2.2	1.9
132	3.7 miles	Background	Waterfront/ Open Water	X	X	X	0.4	0.5	0.2	0.4
140	4.7 miles	Background	Rural Uplands/ Ridgelines	X		X	1.2	1.9	1.3	1.5
149	0.2 miles	Foreground	Rural Uplands/ Ridgelines	X	X	X	2.5	1.9	2.1	2.2
165	2.6 miles	Mid-ground	Rural Uplands/ Ridgelines	X	X		2.4	2.8	2.3	2.5
Average Contrast Rating Scores							1.56	1.88	1.78	1.75

[1] Contrast Rating Scale: 0 (insignificant contrast), 1 (minimal contrast), 2 (moderate contrast), 3 (appreciable contrast), 4 (strong contrast).

As Table 24-5 indicates, the average, overall composite contrast ratings for the 14 selected viewpoints ranged from 0.4 (insignificant) to 3.1 (appreciable). The results of this evaluation are summarized in detail in Section 5.3 of the VIA.

As demonstrated in the contrast ratings scores summarized in Table 24-5 (see also Appendix E of the VIA), the rating scores provided by the three landscape architects were notably consistent. Aspects of the views and photographs/simulations that were noted by both panelists included the rural, undeveloped character of the area; the scale, verticality, novel form, and "industrial" character of the turbines; the importance of the number of turbines visible and presence (or lack) of screening in the view; and, the compatibility of the turbines with the working, utilitarian character of the landscape. It was also noted that the seasonal (winter) and weather conditions depicted in the photographs, including snow cover, overcast or cloudy skies, and the muted tones of vegetation during the dormant season, contributed to the evaluation of contrast in some instances. In those instances, it was noted that perceived contrast may be higher during the summer, when scenic quality is generally higher, or under clear sky conditions when the color contrast of the turbines may be more notable. However, the overall results of the contrast rating indicate that the number of turbines visible and their scale and form contrast with the landform, vegetation, and sky were the primary sources of visual contrast with the existing landscape. The overall results of the contrast rating presented herein therefore provide an accurate range of the perceived visual contrast of the proposed Facility from various viewing distances, landscape similarity zones, and viewer circumstances.

Based on the results of numerous visual impact assessments of wind power projects conducted or reviewed by EDR since 1999, along with published studies of viewer reaction to proposed or constructed projects, the perceived contrast and visual impact of wind turbines is highly variable. Wind turbines are unlike most other energy/infrastructure facilities, such as transmission lines or conventional power plants that are almost universally viewed as aesthetic liabilities. Wind turbines have a clean sculptural form that is considered attractive by some viewers (Pasqualetti e al., 2002). Consistent with the findings of the contrast rating evaluation summarized above, the greatest perceived visual impact typically occurs when numerous turbines are visible, where the turbines are close to the viewer, or where the turbines appear out of place in their setting (e.g., in a residential context). These conditions tend to heighten the Facility's contrast with existing elements of the landscape in terms of line, form, and especially scale.

Although at times offering appreciable contrast with elements of the landscape, the proposed Facility will not necessarily be perceived by viewers as having an adverse visual impact. In EDR's experience, operating wind power projects in New York State have generally received a positive public reaction following their construction. This observation is supported by recent annual surveys conducted by Jefferson County Community College in Lewis County, New York (location of the 195-turbine Maple Ridge Farm Facility in operation since 2006), which revealed strong community support for wind power (JCCS, 2008, 2010, 2011, 2012). A significant majority (approximately 90%) of Lewis County residents who participated in these surveys expressed support for the development of additional wind energy projects (JCCS, 2010, 2011, 2012). Approximately 70% of respondents have consistently indicated that wind farms have had a positive impact on Lewis County (JCCS, 2009, 201, 2012). The 2008 survey indicated that 77% of individuals that were able to see and/or hear turbines from their homes indicated that the wind farms have had a positive impact on Lewis County. Additionally, only 7.5% of participants who live within 1 mile of the nearest wind turbine felt that wind farms have had a negative impact (JCCS, 2008).

This finding is consistent with a number of broader studies that have found increased local support for wind projects once they are constructed and become operational. Public support often follows a "U" pattern, in which acceptance is initially high, drops during the planning and construction, and then rebounds after the wind farm commences operation, and impacts are found to be less detrimental than feared (Firestone et al., 2009). Similar results have also been documented in public opinion/acceptance surveys regarding constructed wind power projects in other locations (Bishop and Proctor, 1994; Gipe, 2003). A recent study of public perception of wind power in Scotland and Ireland (Warren, et. al., 2005) provided the following conclusions:

> *"A remarkably consistent picture is emerging from surveys of public attitudes to wind power, and the case studies provide further evidence that this picture is a representative one. Large majorities of people are strongly in favour of their local windfarm, their personal experience having engendered positive attitudes. Moreover, although some of those living near proposed windfarm sites are less convinced of their merits, large majorities nevertheless favour their construction. This stands in marked contrast with the impression conveyed in much media coverage, which typically portrays massive grassroots opposition to windfarms."*

Based on the analysis in this Exhibit and the VIA, it is expected that similar overall reactions, with some individual variability in acceptance, will result for this Facility.

(8) Visible Effects Created by the Facility

As previously mentioned, part of the visual impact analysis included a study of potential shadow flicker impacts on nearby receptors. Details of this study are enumerated in in Section (a)(9), and Exhibit 15 of this Article 10 Application.

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