Heritage Wind Project

Case No. 16-F-0546

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 the Facility's visual impacts. 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 (USDI) Bureau of Land Management (BLM)(USDI, 1980), U.S. Department of Agriculture (USDA), National Forest Service (USDA, 1995), the U.S. Department of Transportation (USDOT) Federal Highway Administration (USDOT FHWA,1981, 2015), U.S. Army Corps of Engineers (Smardon et al., 1988), and the New York State Department of Environmental Conservation (NYSDEC) (NYSDEC, 2000). The components of the VIA include identification of Visually Sensitive Resources (VSRs), viewshed mapping, confirmatory visual assessment fieldwork, visual simulations (photographic overlays), cumulative visual impact analysis, and proposed visual impact mitigation. The VIA, included as Appendix 24-A to this Article 10 Application, addresses the following issues:

(1) Character and Visual Quality of the Existing Landscape

Per the definition set forth at 16 NYCRR § 1000.2(ar), the Visual Study Area (VSA) 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*."

To establish an inclusive VSA based on the current range of turbine technology available, the Heritage Wind Project VSA has been defined as the area within 10 miles of the Facility Site, plus an extension north, to capture the resources associated with the Lake Ontario shoreline, the boundaries of which are depicted on Figure 3.1-1 within Appendix 24-A of this Application.

The VSA lies within the Ontario Lowlands physiographic region of New York State. As a result of glaciation there are flattened landscapes in the northern portion of the VSA and low hilly relief in the southern portion. At the northernmost portion of the VSA, the Lake Ontario shoreline is fairly even with no bays, but two waterway outlets. A steep bluff rises to 40 feet above the lakeshore, with a thin gravel beach at the foot along the lake edge. To the south of this bluff, the land has minimal topography with gently undulating pockets. The site slopes moderately from a low 246 feet above mean sea level (AMSL) at Lake Ontario to a maximum of approximately 975 feet AMSL at the south-central portion of

the VSA, north of Interstate 90. Swamp lands along the Orleans/Genesee County line are remnants of prehistoric Lake Tonawanda, which existed during the last ice age. Continuing south into Genesee County land gives rise to drumlins south and southeast of the proposed turbines. Streams and rivers in the VSA flow north toward Lake Ontario. In the central and southern portions of the VSA channels of larger streams are fairly young and valley walls have minimal relief. Downstream valley walls become deeper ranging from 10-30 feet, and closer to Lake Ontario streams have carved gorges 40 to 60 feet or more in depth (USDA, 2020).

Per the requirements set forth in 16 NYCRR § 1000.24(a)(1), Landscape Similarity Zones (LSZs) must be defined within the visual study area and along with other indicators of potential visual impact on viewshed maps. Definition of discrete landscape types within a given visual study area will provide a useful framework for the analysis of the Facility's potential visual effects. These landscape types, referred to in the VIA and this Exhibit as LSZs, will be 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, 1988; USDA, 1995; USDOT FHWA 1981, 2015; USDI BLM,1980). Within the visual study area, seven distinct LSZs were defined, the descriptions of which can be found in Appendix 24-A Section 3.3. The approximate location of these zones is illustrated in Figure 3.3-1 of the VIA (Appendix 24-A). LSZs within the visual study area are described in more detail in the VIA and include the following:

- Agricultural/Rural Residential
- Forest
- Waterfront
- Village/City
- Wetland
- Hamlet
- Canal

(2) Visibility of the Facility

The VIA includes an analysis of Facility visibility and identifies locations within the VSA where there is potential for the proposed wind turbines to be seen from ground-level vantage points. This analysis included identifying potentially visible areas on viewshed maps and verifying Facility visibility in the field. Topographic and vegetation viewshed maps were created to identify potential visibility of wind turbines utilizing ArcGIS software. 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. The purpose of the field visits was to verify the existence of direct lines of sight to the Facility as indicated by a viewshed analysis, and to

obtain photographs for subsequent use in the development of visual simulations. With respect to the methodology to be used for line of sight profiles, see section (b)(1) below.

Environmental Design & Research, Landscape Architecture, Engineering & Environmental Services, D.P.C. (EDR) personnel conducted field review within the VSA on two separate occasions, August 15, 2019 and January 02, 2020. During the site visit, EDR staff members travelled public roads and the Erie Canalway Trail to visited public vantage points within the VSA to document potential Facility visibility and confirm the results of the viewshed analysis. This determination was based on the visibility of distinctive hedgerows, road patterns, and 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 214 representative viewpoints within the VSA. The viewpoints document potential visibility of the Facility from the various LSZs, distance zones, directions, VSRs, and areas of high public use throughout the VSA. During the field visits, various weather conditions were observed, consisting of clear blue, partly cloudy, and overcast skies which represented the different conditions typical within the VSA and favorable conditions for long distance viewing. A representative photograph documenting the general view toward the Facility Site from each viewpoint is included in Appendix 24-A.

During the site visit, photographs were taken using digital SLR cameras with a minimum resolution of 24 megapixels.[1] All cameras utilized a focal length between 28 and 35 mm (equivalent to between 45 and 55 mm on a 35mm sensor). 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). To assist with viewer orientation and potential Facility visibility in the field, global positioning system (GPS) units were combined with a live mapping unit in ESRI Collector® (Collector). The data contained in the Collector unit included the viewshed analysis results, VSRs, a topographic and aerial base map, and the current user location. At each of the viewpoints, the GPS was used to document the camera location, direction of view, time, and notes for each photo position. Viewpoints photographed during field review generally represented the most open, unobstructed available views toward the Facility Site.

The results of EDR's field review, organized according to LSZ, are summarized below:

Agricultural/Rural Residential

Field review within the Agricultural/Rural Residential LSZ revealed that the greatest concentrations of open views toward the Facility Site occur within this zone, confirming the results of the viewshed analysis. Open fields in the vicinity of the Facility provide open views of near foreground and foreground turbines. Many local roads, such as Culver Road (Viewpoints 54, 55, 58, 59, 60, and 61) and Oak Orchard Road (Viewpoints 64, 65, 66, and 67) have

[1] Digital SLR cameras used in the photography fieldwork included Canon EOS Mark IV and Nikon D7100.

high turbine visibility within the foreground zones in the Agricultural/Rural Residential LSZ. While less concentrated, these areas of visibility extend into the middle ground, particularly in the mucklands to the east of the Facility (Viewpoints 97, 98, and 105). Within this LSZ, field verification confirmed the results of the viewshed analysis within the background zone. Visibility of the Facility at distances over 4 miles decreases due to the screening effects of hedgerows and woodlots, but small pockets of visibility were documented to the south of the Facility (Viewpoints 106, 109, 114, and 138). In the eastern portion of the VSA, visibility becomes significantly more limited, as suggested by the viewshed analysis. Viewpoints 1, 2, 91, and 92 illustrate views in which the turbines, while potentially visible, would likely become subordinate to foreground features due to their distance from the Facility and partial screening resulting from vegetation and structures.

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Forest LSZ

Field review confirmed that visibility of the Facility from the Forest LSZ, which can be found throughout the VSA, is very limited. Under leaf-off conditions, the density of tall forest vegetation in larger forest stands, and small woodlots, screens most outward views toward the Facility Site. The highest likelihood for Facility visibility within this zone is along the forest edge directly adjacent to open land associated with residences or farm fields, and from a few elevated vantage points. For example, Viewpoint 121 from Oak Orchard Wildlife Management Area (WMA) in the Town of Oakfield, illustrates potential visibility toward the Facility Site from an observation tower in an area with sparse forest vegetation. However, this type of view is rare within the Forest LSZ.

Waterfront

Field review generally confirmed the results of the viewshed analysis within the Waterfront LSZ. However, the primary area of visibility within this LSZ is on the surface of Lake Ontario, over 11.5 miles from the Facility, and was not field verified. Although the viewshed analysis indicated potential visibility along the lake shore, field verification suggested that this visibility would be minimal and would likely only include the upper portions of some turbine blades.

Village/City

Field review revealed that Facility visibility from within the Village/City LSZ is likely to be more limited than the viewshed analysis results suggest. This is particularly the case for the Village of Brockport, where the lack of lidar data and conservative structure height assumptions (see Section 4.1.1 of the VIA) suggest visibility in the dense residential neighborhoods in the center of the Village. Viewpoints 5, 143, 145, and 146 all confirm that views from within the Village of Brockport will be limited by the presence of mature vegetation, tall structures, and typical street side clutter such as utility poles and storefront signs. However, field review did suggest that very limited visibility

of the Facility may be available from Residence Drive on the SUNY Brockport campus. Field review also suggested that the Villages of Holley, Albion (Viewpoints 197, 26, 27), Oakfield (Viewpoints 115, 116, and 117), and Elba (Viewpoints 111, 112, and 113) will have minimal Facility visibility, typically limited to the outskirts of the villages or along interior streets that are aligned with one or more turbines. Field review confirmed a lack of open views toward the Facility from the City of Batavia and Village of Medina.

Wetland

Field review within the Wetland LSZ did not include documentation of any available views from the open water portions of the Oak Orchard or Iroquois NWR where the viewshed analysis suggests potential visibility of the Facility. Designated viewing areas such as the North Marsh and Cayuga Pool (Viewpoints 132, 200), Ringneck Marsh and Upper Stafford Marsh (Viewpoints 121, 201), and Schoolhouse Marsh overlooks, along with the Oak Orchard Eagle viewing tower (Viewpoint 121), provide internal views of the Wetland LSZ, with limited opportunities to view past the immediate foreground. Mature vegetation at the boundaries of the marsh/wetland areas effectively screens long distance views in most locations. Viewpoints 132 and 200 are taken from highpoint overlooks at two designated locations within the Iroquois NWR. As illustrated in the photographs, middle ground mature vegetation will serve to considerably screen views toward the Facility site. However, Viewpoint 129, which occurs within the Iroquois NWR, and borders the Wetland LSZ, illustrates minimal screening in the direction of the Facility. Wetland LSZ areas to the east of the Facility (in the mucklands) and bordering agricultural fields demonstrated an increase in Facility visibility during the field review. For example, Viewpoint 105 illustrates a view with several wetland characteristics and open views toward the Facility, confirming the results of the viewshed analysis.

Hamlet

Field review within the Hamlet LSZ confirmed the results of viewshed analysis. The Hamlet of Barre Center, which included high concentrations of Facility visibility according to the viewshed results, was confirmed to have multiple opportunities for views toward the Facility Site, as illustrated in Viewpoints 71, 72, 73, and 194. The available views vary greatly depending on user group and specific viewing location. A through-traveler or commuter will experience temporary glimpses of the Facility through the adjacent roadside buildings and vegetation. The most common experience will be that of local residents viewing the Facility from their home or yard. Although specific views from private backyards were not part of the field review, documentation of the potential impact to these areas is included in the representative views from the hamlets. Views from within the more distant hamlets such as Shelby (Viewpoint 128), Knowlesville (Viewpoint 192), Eagle Harbor Station (Viewpoint 186), and Hulberton (Viewpoint 160) typically had minimal visibility in the direction of the Facility due to the screening effects of vegetation and structures.

Canal

Field review confirmed that visibility within the Canal LSZ generally conforms with the results of the viewshed analysis, with a few exceptions in the vicinity of the Village of Brockport. Viewpoints 142, 144, 145, and 146 all occur within the Village of Brockport, but also represent the Canal LSZ. As illustrated in the photographs of these viewpoints, visibility toward the Facility is generally limited to the foreground due to screening provided by adjacent vegetation and structures, suggesting that the Facility would not be visible from these locations. During field review a field photographer traveled over 20 miles of the Erie Canal Trail to verify the results of the viewshed analysis. Where visibility was indicated by the viewshed analysis, field review determined that vegetation, topography, and structures would be more effective screening features than suggested by the viewshed analysis. To illustrate the anticipated visibility from locations along the Erie Canal Trail, several wireframe overlays are presented in Section 5.2.

(3) Visibility of Above-ground Interconnections and Roadways

The Facility does not include any overhead collection lines. Therefore, this information is not included in the Application. A 16-foot wide gravel drive is represented in any simulations where the proposed access roads would be visible in the photograph. The access roads will resemble the existing farm lanes, driveways and state forest roads present throughout the Facility site and have limited visual impact.

(4) Appearance of the Facility Upon Completion

To show anticipated visual changes associated with the proposed Facility, three-dimensional (3D) modeling software was used to create realistic photographic simulations of the proposed Facility from each of the 16 selected viewpoints. (The Viewpoint selection process is discussed in Section (b)4 below.) The photographic simulations were developed by using Autodesk 3ds Max Design® to create a simulated perspective (camera view) to match the location, bearing, and focal length of each existing conditions photograph. Existing landscape elements in the view were modeled using detailed lidar data representing roads, buildings, and topography. Once the camera was roughly aligned to match the photo, 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 proper proportion, perspective, and 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.

For the purposes of this analysis, it was assumed that all turbines would be Vestas V162-5.6 (5.6 MW) turbines with a hub height of 125 meters (410 feet) and a rotor diameter of 162 meters (531 feet), which represents the tallest maximum blade tip height (675 feet above ground level) under consideration at the time this report was prepared.. All turbine rotors were modeled facing into the prevailing wind (i.e., oriented to the south). The met towers were assumed to be 130-meter self-standing lattice structures. The collection substation, POI substation, and O&M facility will be located adjacent one another. The collection substation was modeled at a maximum height of 60 feet at the lightning masts/rods, the POI substation was modeled at a maximum height of 44 feet, and the O&M facility was assumed to be approximately 27 feet in height and similar in style to a pole barn.

Using the camera view as guidance, the visible portions of the modeled Facility components and clearing limits were imported to the landscape model space described above and set at the proper coordinates. Coordinates for proposed turbines and met towers were provided to EDR by the Applicant. Along with the turbines, proposed clearing limits and the location and appearance of other components were incorporated into the photographic simulations.

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 Autodesk 3ds Max Design® 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® and portions of the Facility components that fell behind vegetation, structures or topography were masked out. Adobe Photoshop® was also used to take out any existing structures or vegetation proposed to be removed as part of the Facility. Once the turbines or met towers 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® and then overlaying the shadows on the simulated view with the proper fall-off and transparency using Adobe Photoshop®. A graphic illustration of the simulation process is presented in Figure D of the VIA (see Appendix 24-A).

For some viewpoints meeting a majority of the selection criteria but located where turbines are determined to be substantially screened from view, wireframe renderings were prepared to illustrate the degree of screening provided by landscape features within the photograph. In these wireframe renderings, the turbines (shown in light blue for illustrative purposes), are placed on top of the image at the scale and location in which they would appear if no intervening topography or vegetation was present. The wireframe renderings are included in Section 5.2 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 (see Table 5.1-1 and Figure 5.1-1 of Appendix 24-A). Nighttime photos from the Fenner Wind Power Project[2] (Figure 5.3-1 of Appendix 24-A), which is located in Madison County, New York and has been in operation since 2001, are included to illustrate the type of nighttime visual impact that could occur at certain viewpoints. It should be noted that due to the increased height of the Project turbines, it is likely that two FAA lights will be required for each turbine. The photographs shown in Figure 5.3-1 of Appendix 24-A show a single light. 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 or 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 by the lack in topographic change (elevated viewpoints), combined with the mature hedgerows and forest cover that occurs throughout the VSA, and in areas of more concentrated human settlement, where existing light sources will limit the visibility and contrast of the aviation warning lights.

The O&M facility will require full time lighting, not dissimilar to typical residential security lights, but will also utilize full-cutoff fixtures in order to minimize light trespass beyond the Facility and its property limits. Similarly, the substations will require some full-time security lighting. Greater nighttime visual impacts could occur at the O&M facility and substations during limited time periods when support lighting may be necessary to safely perform nighttime maintenance activities. During such maintenance activities, task lighting will be manually operated as needed. During normal operation, the nighttime visual impacts associated with these facilities will be minimal.

(6) Photographic Overlays

To show anticipated visual changes associated with the proposed Facility, three-dimensional (3D) software was used to create realistic photographic simulations of the proposed Facility from each of the 16 selected viewpoints. The photographic simulations were developed by using Autodesk 3ds Max Design® 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 were modeled using detailed lidar data representing existing landscape elements such as roads, buildings, and topography. Once the camera is roughly aligned to match the photo, minor adjustments were made to camera and target location, focal length, and camera roll to align all modeled elements with the corresponding elements

[2] Nighttime visual simulations of the proposed Project were not collected during field review due to the danger associated with capturing such images from public roads at nighttime.

in the photograph. This assures that any elements introduced to the model space (i.e., the proposed turbines) will be shown in proper proportion, perspective, and 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. See Section (a)(3) above for discussion of the methodology and specific software packages that were used for creating the simulations. The VIA (Appendix 24-A) discusses each of the visual simulations for the Facility at length in Section 4.2.2, and the simulations are attached as Appendix D to 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 as Insets 5.3-31 to 5.3-36 of the VIA. 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. Construction vehicles for the Facility will include pick-up trucks, dump 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. Blade lengths typically control the length of the vehicle, and transport vehicles are designed with articulating (manual or self-steering) rear axles to allow maneuverability through curves. Towers 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 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. This activity may involve tree removal along some narrow, seasonal roads. The temporary expansion of the pavement surface will generally be removed at the completion of construction and the roads restored to their pre-construction condition. Areas of cleared vegetation will be allowed to regrow. Construction activity could also result in damage to the surface of some public roads. However, after completion of construction activities, damage caused by heavy construction vehicle traffic (especially on any roads that had temporary repairs made during construction activities) will be repaired, and the roads restored to their pre-construction condition. As described in Exhibits 21 and 22 of the Article 10 Application, construction of the Facility will result in some vegetation clearing and temporary soil disturbance at turbine sites and along the routes of

access roads and electrical collection lines. It is generally assumed that a radius of up to 265 feet will be cleared around each turbine, a 75-foot wide corridor will be cleared along access roads, and a 30-foot-wide corridor per collection line circuit will be cleared along underground electric collection lines that are not adjacent to access roads.

- 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. In addition to protecting natural resources, these measures will minimize the visual impact associated with landscape clearing and disturbance during construction of the Facility.
- The construction laydown yard will be developed by stripping the topsoil, grading as necessary, and installing 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. However, this component of the Facility is temporary, and it is assumed that the laydown yard will be removed, and the site restored, at the completion of construction. 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 30 feet wide will be required to accommodate large cranes and oversized construction vehicles. This road width will be narrowed to 20 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. At each tower site topsoil will be stripped from the excavation area and stockpiled for future site restoration. Following topsoil removal, heavy equipment will be used to excavate the foundation hole. Subsoil and rock will be segregated from topsoil and stockpiled for reuse as backfill. Once the concrete foundation is poured and sufficiently cured, the excavation area will be 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 will be excavated, segregated, and stockpiled adjacent to the trench. Following cable installation, the trench will be backfilled with suitable fill material and any additional spoils spread out or otherwise properly disposed

of. Following installation of the buried collection line, areas will be returned to pre-construction grades and revegetated.

- Turbine assembly and erection involves 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, placement of the complete rotor onto the nacelle. The visibility of these cranes will be comparable to the visibility of the proposed turbines (in terms of height). However, the presence of crane equipment at each turbine site will be temporary; limited to the time necessary to complete turbine erection.
- Following construction activities, all temporarily disturbed areas will be restored to original grades (where feasible) and seeded to reestablish vegetative cover. 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.

Construction of the Facility, as described above, will result in impacts to soils and on-site plant communities. These impacts will include temporary clearing of vegetation during construction, as well as permanent loss of vegetated habitats by conversion to built facilities. Impacts to vegetation from construction and operation of the proposed Facility are presented in Exhibit 22(b).

(8) Nature and Degree of Visual Change from Operation

To evaluate anticipated visual change associated with the Facility, the photographic simulations of the completed Facility were compared to photos of existing conditions from each of the 16 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 four registered landscape architects (two in-house and two independent) who were then asked to evaluated the visual impact of the proposed Facility in contrast with existing elements of the landscape. The methodology utilized in this evaluation is a modified version of the BLM contrast rating methodology (USDI BLM, 1980) that was developed by EDR in 1999 for use on wind power projects (and subsequently updated). It involves using a short evaluation form, and a simple numerical rating process to assign visual contrast ratings on a sale of 0 (insignificant) to 4 (strong). 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. Color refers to the perceived hue of elements within the landscape. Texture in this context refers to the visual surface characteristics of an object. 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 because 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 project, especially from significant aesthetic resources, have the greatest potential for visual impact.

- *Atmospheric Conditions*: Clouds, precipitation, haze, and other ambient air-related conditions affect the visibility of an object or objects. These conditions can greatly impact the visibility and contrast of landscape and project 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 project elements.

- *Scale*: The apparent size of a proposed project in relation to its surroundings can define the compatibility of its scale within the existing landscaping. Perception of project 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 project components can make them more noticeable, but in the case of wind turbines, have also been shown to 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 & 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 & Hansen, 1988)."

Copies of the completed rating forms are included in Appendix E of the VIA, and the results of the evaluation process are summarized in VIA Table 5.3-1. A summary of the results is contained in Section (b)(7) below.

(9) Operational Effects of the Facility

The key operational effect of the Facility from a visual perspective is shadow flicker. Shadow flicker refers to the moving shadows that an operating wind turbine casts over an identified receptor (i.e., non-participating residence) at times of the day when the turbine rotor is between the sun and a receptor's position. During intervals of sunshine, wind turbines will cast a shadow on surrounding areas as the rotor blades pass in front of the sun, and if these moving shadows pass over a window, they can cause a flickering effect. The distance between a wind turbine and a potential shadow flicker receptor affects the intensity of the shadows cast by the blades, and therefore the intensity of flickering. At distances beyond roughly 10 rotor diameters, shadow flicker effects are generally considered negligible (BERR, 2009; DECC, 2011; DOER, 2011).

Appendix 15-A discusses the assumptions used to conduct the shadow flicker analysis. These include turbine locations, dimensions, receptor locations, and sunshine probability. The shadow flicker analysis lists the annual average shadows expected to occur at every sensitive receptor. Annual average shadow flicker hours are the number of hours, including partial hours that are expected to occur in a typical year with sunshine and cloud levels equal to those in a typical year. The analysis evaluated the use of the Vestas V162-5.6 wind turbine since it is the unit with the largest rotor diameter of those under consideration. A preliminary curtailment plan, which accounts for turbine stoppage within the operational cut-in/cut-out speeds, was used in assessing the predicted shadow flicker impact of the Facility.

As discussed in Appendix 15-A, of the 87 receptors predicted to exceed 30 hours per year of shadow flicker, after taking the curtailment plan into consideration, 41 are Facility participants, while the remaining 46 are non-participating receptors. The 46 non-participating receptors that could have 30 or more annual average shadow hours consist of:

- 40 non-participating year-round residences,
- 4 non-participating unknown structures,

- 1 non-participating commercial structure (unlikely to be occupied at all times), and
- 1 public structure (cemetery).

As discussed in the Shadow Flicker Report (Appendix 15-A), two of the non-participating receptors are commercial or public structures and will be occupied only periodically. As a result, there is little, if any, likelihood that individuals in these receptors will actually experience 30 hours per year of shadow flicker.

More generally, the assumptions underlying the shadow flicker analysis are conservative, and the analysis does not take into account important real-world factors, including the actual location and orientation of windows and the screening effects associated with existing, site-specific conditions and obstacles such as trees and/or buildings. Also, the analysis assumes turbine rotors are in continuous motion outside of the curtailment windows. Given these assumptions, the predicted shadow-flicker frequency represents a conservative scenario and likely overstates the actual frequency of shadow flicker that would be experienced at any given receptor location.

Following the final shadow-flicker analysis, if shadow flicker is modeled to exceed 30 hours per year at a non-participating residential receptor, the following mitigation options are available: 1) work with the landowner to sign a neighbor agreement and become a Facility participant, 2) plant trees or install window blinds to block the shadow flicker, and/or 3) install detection systems on the turbines resulting in greater than 30 hours per year of shadow flicker at non-participating receptors. Final mitigation strategies will be selected prior to Facility construction and operation. The Applicant will continue to work with landowners and refine the Facility operational protocol, including the use of curtailment to meet the 30 hour per year threshold.

(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 DEP-00-2, *Assessing and Mitigating Visual Impacts* (NYSDEC, 2000) (hereinafter "NYSDEC Visual Policy"), various mitigation measures were considered. These include the following:

- 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, although certain small mandatory warning and related signs will be located on or adjacent to the turbines at ground level.

- Screening: Due to 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 and rating panel review, the proposed O&M facility is not anticipated to have significant adverse visual effect, and therefore visual screening is not anticipated to be necessary. The proposed interconnection facilities (substations) are located in an area where few, if any, VSRs will be affected. However, these facilities do contrast with the existing rural landscape, and will be visible from some adjacent residences. Screening in the form of perimeter plantings could be effective in reducing the visibility/visual impact of the substations.
- 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 VSA, 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 required setbacks.
- 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 Heritage 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. They believe 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.
- Low Profile: A significant reduction in turbine height is not possible without significantly decreasing power generation. Less generating capacity (resulting from smaller turbines) would 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 & Freeman, 1987; van de Wardt & Staats, 1988). There will

be minimal visual impact from the electrical collection system because the proposed collection system will be installed underground to the maximum extent practicable. If overhead collection line sections are proposed at some later date, it is anticipated that the poles would be relatively low profile and would likely have limited visibility within the VSA. However, depending on the location of potential overhead sections and the sensitivity of proximate resources (unknown at this time), additional visual analysis may be warranted.

- Downsizing: Although reducing the number of turbines could reduce visual impact from certain viewpoints, the visual impact of the Facility from most locations within the visual study area where more than one turbine is visible would change only marginally unless a substantial number of turbines were removed. The Facility already includes a relatively small number of turbines (33) and from most locations where visibility is possible, fewer than 10 turbines could be seen. In addition, elimination of turbines would threaten the Facility's economic feasibility and significantly reduce the socioeconomic benefits of the Facility and reduce the Facility's ability to assist the State in meeting the renewable energy mandates of the 2019 Climate Leadership and Community Protection Act and other State energy policies and programs.
- Alternate Technologies: Alternate technologies for comparable power generation, such as gas-fired or solar-powered facilities, would have different, and perhaps more significant, visual and other 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.
- Non-specular Materials: Non-reflective paints and finishes will be used to the extent practicable on Facility components to minimize reflected glare. If sections of overhead collection line are proposed at a later date, non-specular conductors will be considered for use.
- Lighting: It is anticipated that two medium intensity red strobes will be used to light the turbines 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 and O&M facility will be kept to a minimum and turned on only as needed by manual switch.
- 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 (See Exhibit 29 for details).

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 impacts. Historic structure restoration/maintenance activities could be undertaken to offset any identified visual impacts on cultural resources.

(11) Description of Visually Sensitive Resources to be Affected

Visually sensitive resources of statewide significance were identified within the VSA. As defined in the NYSDEC Visual Policy, these include any of the following types of resources:

- Properties listed on or determined eligible for listing on the State and National Register of Historic Places (S/NRHP).
- State Parks.
- Urban Cultural Parks (or New York State designated Heritage Areas).
- State Forest Preserves (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.
- Sites, areas, lakes, reservoirs, or highways 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 Lands and Scenic Vistas.
- State Nature and Historic Preserve Areas.
- Palisades Park.
- Bond Act Properties purchased under Exceptional Scenic Beauty or Open Space category.
- New York State designated Heritage Areas, including the Erie Canalway National Heritage Corridor.

In addition, resources of local significance within the VSA were also 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 Section (b)(3) below for additional detail on visually sensitive resources, including those identified through public outreach.

(b) Viewshed Analysis

The VIA (Appendix 24-A) 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 (taking into account viewer height). 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 portion of any turbine in the completed Facility could potentially be seen within the VSA during both daytime and nighttime hours based on a direct line of sight, and ignoring the screening effects of existing vegetation and structures. The viewshed analyses were based on maximum blade tip height and FAA warning light height. Additionally, results of the viewshed analysis are shown on maps that depict visually sensitive sites, viewpoint locations, and LSZs within the visual study area.

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 DEM data and assigning a visible or not visible 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 the Application, the viewshed analyses will also serve to document the line of sight profiles for resources of statewide and local concern. However, line of sight profiles may still be prepared to highlight potential or lack of visibility to a certain sensitive receptor.

Table 24-1. Summary of Viewshed Results for the Visual Study Areas

Number of Turbines Visible	VSA[1] Viewshed Results							
	Daytime Visibility				Nighttime Visibility			
	Blade Tip DEM (Topography Only)		Blade Tip DSM (Topography, Structures, and Vegetation)		FAA/Nacelle DEM (Topography Only)		FAA/Nacelle DSM (Topography, Structures, and Vegetation)	
	Square Miles	% of Study Area	Square Miles	% of Study Area	Square Miles	% of Study Area	Square Miles	% of Study Area
0	42.1	6.8	475.7	76.9	79.6	12.9	529.2	85.5
1-5	15.4	2.5	59.0	9.5	30.1	4.9	47.2	7.6
6-10	14.8	2.4	27.9	4.5	27.2	4.4	18.1	2.9
11-15	15.2	2.5	18.2	2.9	26.2	4.2	10.2	1.7
16-20	16.3	2.6	13.3	2.2	28.1	4.5	6.7	1.1
21-25	24.0	3.9	11.0	1.8	38.1	6.2	4.4	0.7
26-33	490.9	79.3	13.6	2.2	389.4	62.9	2.9	0.5
Total Visible	576.6	93.2	143.1	23.1	539.1	87.1	89.5	14.4

[1]The VSA includes approximately 618.7 square miles, or approximately 396,000 acres.

Potential wind turbine visibility, as indicated by the viewshed analysis, is illustrated in Figure 5.1-1 of the VIA and summarized in Table 24-1, above. Based on the screening provided by topography alone, the blade tip viewshed analysis indicates some portion of the proposed turbine array could potentially be visible from approximately 93.2% of the VSA. 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. Due to the relative lack of topographic relief within the VSA, very few areas will be screened by hills and valleys. Areas of notable screening occur within the Town of Batavia in the vicinity of Interstate Route 90, the Towns of Murray, Albion, and Ridgeway where a distinct topographic ledge creates a visibility shadow to the north, and small portions of the Towns of Elba, Clarendon, Sweden, Bergen, and Byron, where drumlin features screen the Facility from view.

Areas of potential nighttime visibility, as indicated by the FAA topographic viewshed analysis (Appendix 24-A, Figure 5.1-1, Sheet 2; Table 5.1-1) include approximately 87.1% of the VSA. This analysis indicates that the potential visibility of FAA warning lights 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.

Factoring vegetation and structures into the viewshed analysis significantly reduces potential Facility visibility throughout the VSA (Appendix 24-A, Figure 5.1-1, Sheets 3 and 4). According to the DSM viewshed analysis, the screening provided by structures and vegetation, in combination with topography, will serve to block daytime views of the Facility from approximately 76.9% of the VSA (i.e., only 23.1% of the VSA is indicated as having potential Facility visibility). Areas of potential nighttime visibility, as indicated by FAA DSM viewshed analysis, are limited to approximately 14.4% of the VSA. Based on the results of the DSM viewshed analysis, Facility visibility is heavily concentrated in the central portion of the visual study area within the near foreground distance zone. This visibility is generally only interrupted by large contiguous woodlots and forests or structures associated with hamlets such as Barre or rural homes. However, due to the proximity of the turbines, trees and buildings are not effective in screening the turbines over any notable distance beyond the screening feature. In the foreground distance zone, visibility begins to diminish as a result of vegetative screening associated with large forested tracts and woodlots. Generally, visible areas in the foreground zone occur in open fields and along roads aligned with one or more turbines. Additionally, a portion of the Oak Orchard WMA was indicated as having foreground visibility of the Facility from the open water and wetland areas. The viewshed analysis suggests additional reduction in Facility visibility in the middle ground distance zone. Large forested areas associated with Oak Orchard and Iroquois WMAs in the southwestern portion of the VSA, generally restrict visibility to open ponds or wetland tracts.

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, forest vegetation, and structures are highly variable between the different zones, resulting in substantially different levels of potential Facility visibility.

Table 24-2. Summary of Blade Tip DSM Viewshed Results by Landscape Similarity Zone

Number of Turbines Visible	VSA[1] Viewshed Results by Landscape Similarity Zone (LSZ) (% of LSZ w/ Potential Facility Visibility)						
	Agricultura / Rural Residential	Forest	Waterfront	Village/City	Wetland	Hamlet	Canal
0	62.9	95.7	67.2	89.1	79.5	92.1	90.6
1-5	14.8	2.4	12.2	6.5	11.4	4.0	4.7
6-10	7.3	0.8	6.7	1.9	4.3	1.4	2.1

11-15	4.8	0.4	5.1	1.0	1.9	0.7	1.4
16-20	3.5	0.3	3.8	0.7	1.2	0.6	0.5
21-25	2.9	0.2	3.1	0.5	0.8	0.6	0.2
26-33	3.8	0.2	1.9	0.3	0.9	0.6	0.5
Total Percent Visible	**37.1**	**4.3**	**32.8**	**10.9**	**20.5**	**7.9**	**9.4**

[1]The VSA includes approximately 618.7 square miles, or approximately 396,000 acres.

- The Forest LSZ offers the least amount of potential Facility visibility with only 4.3% of the area within the Forest LSZ indicated as having potential views toward the Facility. This LSZ generally offers no outward visibility due to the screening effects of the forest vegetation. However, small portions of the Forest LSZ may offer limited outward views where farm fields directly abut the perimeter of the forests and where roads through forested areas are directly aligned with a portion of the Facility. The occurrence of these areas is limited, and there will be little Facility visibility beyond the periphery of the forest areas, particularly during the growing season. Additional portions of the Forest LSZ with potential turbine views include areas where Facility-related forest clearing will occur, as well as natural clearings or areas of sparse/low vegetation within forested settings.
- The Hamlet LSZ presents potential opportunities for Facility visibility in 7.9% of its area within the VSA. Visibility for the majority of this 7.9% will find blade tips visible above treetops and where roads directly align with a portion of the Facility. However, a small percentage of this LSZ is in close proximity to the proposed Facility and views of the Facility will be visible amongst houses, buildings, and vegetation. While these features generally screen middle ground and background turbines, foreground and near foreground turbines far exceed the height of the buildings and vegetation, allowing for views between and over foreground structures and vegetation.
- According to the DSM viewshed analysis, approximately 89.1% of the area within the Village/City LSZ will be screened from views of the Facility. The Villages of Albion, Holley, Elba, and Oakfield all include small areas of visibility along the outskirts of the villages. This generally results from open space areas or areas of reduced development which allow outward views toward the Facility. In contrast, the Village of Brockport is indicated as having significant Facility visibility. However, this largely reflects the lack of lidar availability within this Village, and the conservative building height assumptions (15 feet) applied in the analysis may overstate potential visibility. Of note, more than half of the area indicated as having turbine visibility within Village/ City LSZ would only have the potential to see between one and five turbines.
- The Wetland LSZ is screened from views of the Facility from approximately 79.5% of its land area within the VSA. This is due to the fact that the large contiguous wetlands within the VSA are typically surrounded by forest vegetation. Additionally, by their very nature, the large wetland complexes generally lack topographic

relief, thus elevated vantage points are rarely available. This lack of elevation increase the effectiveness of screening provided by the adjacent forested areas. In areas where views are available within the Wetland LSZ over half of these areas have the potential to see only one to five turbines.

- Approximately 9.4% of the geographic area within the Canal LSZ may have potential Facility visibility. The low elevation of the Canal LSZ, tree lined banks of the canal, and distance from the Facility all limit visibility within this LSZ. As suggested by the viewshed analysis results, the geographic areas of visibility within the LSZ occur mostly when the Canal LSZ is abutting other LSZs with minimal screening, such as the Agricultural/Rural Residential LSZ.
- The Waterfront LSZ has potential Facility visibility from 32.8% of its area most of which is from the open waters of Lake Ontario. However, these areas of potential visibility are generally over 10 miles from the nearest turbine, and will be seen by very few viewers. Visibility of the Facility from the shore of Lake Ontario is limited by shoreline vegetation. Similarly, views of the Facility from waterways such as Oak Orchard Creek are limited by valleys combined with screening provided by vegetation.
- The greatest potential for visibility of the turbines is indicated within the Agricultural/Rural Residential LSZ. The blade-tip DSM viewshed indicates that 37.1% of acreage within this zone could potentially have views of the Facility. However, the turbine count analysis suggests that the greatest areas of potential Facility visibility within this zone (14.8%) would only see one to five wind turbines. Only 3.8% of the land area within the Agricultural/Rural Residential LSZ has the potential to see the full Facility (26 to 33 turbines).

(2) Viewshed Methodology

The topographic viewshed maps for the proposed turbines were prepared using 2-meter lidar digital elevation model (DEM) data for the VSA, the location and height of all proposed turbines (see Appendix 24-A, Figure 2.2-1), an assumed viewer height of 6 feet above ground level (AGL), and ESRI ArcGIS® software with the Spatial Analyst extension. Two topographic viewsheds were mapped, one to illustrate "worst case" daytime visibility (based on a maximum blade tip height of 676 feet AGL), and the other to illustrate potential visibility of FAA obstruction warning lights at night. The FAA warning light viewshed was based on the maximum nacelle height of 420 feet AGL, and the assumption that all turbines would be equipped with lights as required by the FAA for turbines exceeding 499 feet AGL.

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 the proposed turbine locations from observation points throughout the VSA. 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 VSA 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 visual study area. 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 or structures 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.

In order to more accurately identify areas with potential Facility visibility, a second-level analysis was conducted, incorporating the screening effect of structures and vegetation. This analysis used the Federal Emergency Management Agency (FEMA) light detection and ranging (lidar) data for Orleans County (2014), and United States Department of Agriculture (USDA) lidar data for Genesee County (2011/2012). lidar is a remote sensing method that uses pulsed laser light to measure ranges (variable distances) to the Earth to generate precise, three-dimensional information about the shape of the Earth and its surface characteristics (National Oceanic and Atmospheric Administration [NOAA], 2018). A digital surface model (DSM) of the VSA was created from these lidar data, which includes the elevations of buildings, trees, and other objects large enough to be resolved by lidar technology. The DSM viewshed analysis considers the screening effects of topography, vegetation, and structures. Monroe County lidar data are not available to the public. As a result, the DSM for the Monroe County portion of the VSA was prepared based on the location of forested areas as indicated in the 2016 NLCD and an assumed canopy height of 40 feet. Building footprints were obtained from Microsoft's US Building Footprints dataset and were assigned an assumed height of 15 feet. Screening provided by street/yard trees is not accounted for within the Monroe County DSM.

To account for clearing of forest vegetation that would be required for Facility construction, the DSM was modified to reflect the bare-earth elevation within an approximated limit of clearing around proposed Facility components. This was based on generalized assumptions that areas within 265 feet of turbines, as well as areas within a 100-foot wide corridor along access roads, and a 70-foot wide corridor along collection lines, would be cleared of forest vegetation and maintained in an open condition. Additionally, to account for features such as local distribution lines (the DSM would project these lines to ground level, creating screening features), thin hedgerows, and other minor screening features, a corridor of 70 feet along all public roads was cleared to conservatively eliminate these elements. The modified DSM was then used as a base layer for the second-level viewshed analysis. Once the viewshed analysis was complete, a conditional statement was used to set Facility visibility to zero in locations where the DSM elevation

exceeded the bare earth elevation by six feet or more. This was done for two reasons: 1) because in locations where trees or structures are present in the DSM, the viewshed would reflect visibility from a vantage point on the tree tops or building roofs, which is not the intent of this analysis and 2) to reflect the fact that ground-level vantage points within buildings or areas of vegetation exceeding six feet in height will generally be screened from views of the Facility.

As with the topographic viewshed analysis previously described, the DSM viewshed analysis was conducted for both daytime visibility (based on the maximum height of 676 feet AGL) and for potential nighttime visibility of FAA warning lights, based on an approximate FAA warning light height of 420 feet AGL.

A DSM viewshed analysis was also conducted to further evaluate potential visibility of the proposed O&M facility, the collection substation, and the POI substation based on the height of the structures within each facility. Multiple structures associated with each facility were included as sample points in the viewshed analysis, including the tallest structures proposed. Insets 2.2-3 and 2.2-6 of the VIA include illustrations and heights of these facilities.

Because it accounts for the screening provided by structures and vegetation, this second-level analysis is a more accurate representation of potential Facility visibility and is considered to represent the Facility's APE.. However, it is worth noting that because certain characteristics of the turbines and substation that may influence visibility (color, narrow profile, distance from viewer, etc.) are not taken into consideration in the viewshed analyses, being located within the DSM viewshed does not necessarily equate to actual Facility visibility.

(3) Sensitive Viewing Areas

Visually sensitive resources (VSRs) within the VSA were identified in accordance with the NYSDEC Visual Policy and the requirements of Article 10, as described in 16 NYCRR § 1001.24(b)(4). In addition, EDR identified other resources that could be considered visually sensitive based on the type or intensity of use they receive. The types of resources identified in the NYSDEC Visual Policy are consistent with the types of resources identified in 16 NYCRR § 1000.24(b)(4), and include: landmark landscapes; designated wild, scenic or recreational rivers; forest preserve lands, designated scenic vistas, conservation easement lands, scenic byways designated by the federal or state governments; designated scenic districts and scenic roads; designated Scenic Areas of Statewide Significance; state parks or historic sites; S/NRHP sites; 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 VSRs within the VSA, EDR consulted a variety of publicly available data sources, including geospatial resources provided by state, county, town, and village entities. A complete documentation of resources used in the identification of VSRs is included in the Literature Cited section of the VIA (see Appendix 24-A Section 7.0).

In addition, per the requirements set forth in 16 NYCRR § 1001.24(b)(4) as well as the Preliminary Scoping Statement for the Project , the Applicant conducted a systematic program of public outreach to assist in the identification of VSRs. Copies of the correspondence sent by the Applicant as part of this process, and responses received from state, county and municipal stakeholders are included as Appendix F of the VIA. This outreach included the following:

- The Applicant distributed a request on March 4, 2019 for information on possible VSRs to municipal planning representatives, town and village historians, local and regional chambers of commerce, along with multiple local environmental groups. The full distribution list of 177 identified visual stakeholder contacts is provided in Appendix F of the VIA.
- In early April 2019 the Applicant distributed an invitation, to all addresses with zip codes represented in the Town of Barre, soliciting public comment and input on VSRs.

Response to this outreach includes the following:

- The Applicant received eight responses to this outreach effort, identifying additional 511 locally identified VSRs.

The Applicant initiated consultation with the New York State Office of Parks, Recreation, and Historic Preservation (NYSOPRHP) in order to evaluate the Facility's potential effect on historic resources listed or eligible for listing in the S/NRHP (EDR, 2019). At this time, NYSOPRHP has completed review of identified aboveground resources within a 5-mile historic resources study area, these resources are also included in the VIA. As a result of the database review and outreach effort described above, VSRs of national, regional and statewide significance, as well as locally significant aesthetic resources, were identified within the VSA.

Table 3.6-1 of the VIA includes a summary of the types of identified VSRs within the VSA. The mapped locations of inventoried VSRs are shown in Figure 5.2-1 and Appendix A of the VIA. A full list of the identified VSRs within the VSA as well as their distance from the Facility and potential visibility is included in Appendix C of the VIA.
All of the visually sensitive sites that were identified as a result of the research, stakeholder outreach, and subsequent consultation described above are included in Appendix F of the VIA and further described below.

There are no National Parks, National Forests, State Nature Preserves, State Forest Preserves, Scenic Areas of Statewide Significance, exceptionally beautiful or open space Bond Act Properties, or federally or state designated Wild, Scenic or Recreational Rivers within the visual study area. Within the VSA, the following VSRs were identified: two National Natural Landmarks; one National Wildlife Refuge; two designated scenic sites, areas, lakes, reservoirs or highways designated or designated eligible as Scenic; two Heritage areas; and three National Historic Landmarks.

In addition to the scenic resources of statewide significance listed above, the VSA includes aesthetic resources that are regionally and locally significant, sensitive to visual impact, and/or receive significant public recreational use. These aesthetic resources include recreation facilities, public open spaces, population centers, schools, heavily used transportation corridors, and other sites identified during the VIA public outreach effort. A full list of resources identified through the VSR outreach can be found in Appendix F of the VIA.

The Facility's VSA includes 965 aesthetic resources of statewide and local significance identified based on the NYSDEC Visual Policy and/or through the visual outreach process (see Appendix C of the VIA). These include 52 sites and/or districts listed on the NRHP; three state parks; two state heritage areas; three wildlife management areas; 10 -designated trails including 2 state bicycle routes and 7 snowmobile trails; four rivers with public fishing rights easements; ; 67 local parks and recreation areas; 20 named lakes, ponds, and reservoirs; 18 state or federal highways; 50 cities, villages, and hamlets; and 36 schools. Additionally, the VSA includes 185 sites that have been determined by NYSOPRHP to be eligible for NRHP-listing.

(4) Viewpoint Selection

16 NYCRR § 1001.24(b)(4) requires that "*the applicant shall confer with municipal planning representatives, DPS, DEC, OPRHP, and where appropriate, Adirondack Park Agency in its selection of important or representative viewpoints"*[3]. In addition to the consultation with municipal representatives, stakeholders, and residents to identify VSRs (as described above in Section (b)(3) of this Exhibit and in Section 3.6 of the VIA), EDR 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 EDR as part of this process, as well as responses received from stakeholders, are included in Appendix F of the VIA.

- As part of this outreach effort, on November 18, 2019, in accordance with 16 NYCRR § 1001.24(b)(4), EDR distributed a memorandum entitled *Heritage Wind Project LLC (DPS Case 16-F-0546) Recommended*

[3] The APA is not applicable in this instance due to the Facility's location (i.e., not in the vicinity of the Adirondack Park).

Viewpoints - Official Request for Information to 178 state, county, town, city, village, and tribal representatives and stakeholders that were previously engaged to identify VSRs (see Appendix F). This memo included: a summary of research and consultation undertaken as part of the VIA to date; description of the field review/photography conducted for the Facility; and a website link to access documentation done to date illustrating:

  - Facility Visibility and Recommended Viewpoint Locations
  - Recommended Viewpoint Table
  - Viewpoint Photolog
  - Landscape Similarity Zones
  - VSR Table

  In this letter EDR, recommended 12 candidate viewpoints and suggested a goal of 15 simulations total.

- On November 27, 2019, the Applicant distributed a memorandum entitled *Heritage Wind Project: Visual Outreach Information* to all addresses in the zip codes represented within the Town of Barre. The memorandum provided information regarding the Project, with a summary of research and consultation undertaken as part of the VIA to date, a request for viewpoint recommendations, and an invitation to provide input at the local Project office in Albion, New York. A follow-up letter was sent on December 18, 2019 extending the comment period.

In response to this outreach, EDR was contacted by the New York State Department of Public Service, representatives from five municipalities within the VSA, the Niagara Falls Air Reserve Station, and one local resident. Further documentation of the stakeholder responses/comments can be found in Appendix F of the VIA.

Based on the outcome of stakeholder and agency consultation, a total of 16 viewpoints were selected for the development of visual simulations. These viewpoints were selected based upon the following criteria:

- They provide open views of proposed turbines or provide representative views of the screening effects of vegetation, topography, or structures from selected areas.
- They illustrate Facility visibility from VSRs.
- They illustrate typical views from identified LSZs.
- They illustrate typical views of the proposed Facility that will be available to representative viewer/user groups.
- They illustrate typical views of different numbers of turbines, from a variety of viewer distances, and under different lighting/sky conditions, to illustrate the range of visual change that will occur with the Facility in place.
- The selected photos displayed appropriate composition, lighting, and exposure.

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

Table 24-3. Viewpoints Selected for the Production of Simulations

Viewpoint Number	Location and/or VSR Represented	LSZ Represented	Viewer Group Represented	Viewing Distance[1]	View Orientation[3]
26	Albion Central Schools, Athletic Fields	Village/City	Local Residents, Tourists/Recreation	4.1[4]	S
29	State Route 31 (Telegraph Rd.)	Agricultural/Rural Residential	Local Residents	6.3[4]	SSE
34	State Route 31A (W Lee Rd.)	Agricultural/Rural Residential	Local Residents, Through-Travelers/Commuters	3.7	ESE
52	State Route 31A (E Lee Rd.)	Agricultural/Rural Residential	Local Residents	0.4	NE
57	County Road 69 (E Barre Rd.)	Agricultural/Rural Residential	Local Residents	0.3	S to SW
64	County Road 98 (Oak Orchard Rd.)	Agricultural/Rural Residential	Local Residents	0.3	NW to ENE
71	State Route 98 (Oak Orchard Rd.)	Hamlet	Local Residents	0.4	SW
98	Transit Road	Agricultural/Rural Residential	Local Residents	2.2[4]	W
99	West Spoil Bank Road	Agricultural/Rural Residential	Local Residents	1.0	NW
109	County Road 46 (E Saile Dr.)	Agricultural/Rural Residential	Local Residents	8.1[4]	N
120	Reed Cemetery	Agricultural/Rural Residential	Local Residents	4.9	ENE
121	Oak Orchard WMA (Observation Tower)	Forest	Local Residents, Tourists Recreational Users	2.5[4]	ENE
123	County Road 15 (Eagle Harbor Rd.)	Agricultural/Rural Residential	Local Residents	0.3	WNW
124	Gillette Road	Agricultural/Rural Residential	Local Residents	0.4[4]	SE
127	Maple Street	Agricultural/Rural Residential	Local Residents	1.4	ESE to SW
208	Puzzey Road	Agricultural/Rural Residential	Local Residents	0.1[2]	NE
26	Albion Central Schools, Athletic Fields	Village/City	Local Residents, Tourists/Recreation	4.1[4]	S

29	State Route 31 (Telegraph Rd.)	Agricultural/Rural Residential	Local Residents	6.3[4]	SSE
34	State Route 31A (W Lee Rd.)	Agricultural/Rural Residential	Local Residents, Through-Travelers/Commuters	3.7	ESE

[1]Distance from viewpoint to nearest visible turbine (in miles)
[2]Distance from viewpoint to nearest visible Facility component (in miles)
[3]N = North, S = South, E = East, W = West
[4]The nearest visible turbine from this location is not the nearest geographic turbine position relative to the viewer.

In addition to the viewpoints selected for the development of turbine simulations, a 3-mile substation study area was delineated around the subject parcel to determine the potential visibility of the O&M Facility, collection substation, and POI substation. As indicated in Figure 5.1-2 of the VIA, the DSM viewshed analysis suggests that vegetation, in combination with topography and structures, will serve to block views of the proposed substations from approximately 95.1% of the 3-mile substation study area (i.e., 4.9% of the 3-mile substation study area is indicated as having potential visibility of the substations). Based on the results of the DSM viewshed analysis, visibility of the structures will generally be limited to the area immediately surrounding the Facility components on Oak Orchard Road and Puzzey Road, to the southeast of the 3-mile substation study area across Delano Steel Road to West Muck Road, and also including an area adjacent to the hamlet of Barre Center, just north of East Barre Road.

(5) Photographic Simulations

To show anticipated visual changes associated with the proposed Facility, three-dimensional (3D) modeling software was used to create realistic photographic simulations of the proposed Facility from each of the 16 selected viewpoints. The photographic simulations were developed using the method described in Section (a)(5) of this Exhibit. As indicated in (b)(4) above, viewpoints were selected, in part, for their open views. As a result, there will be no significant screening of the proposed Facility due to vegetation in the photographic simulations. Any simulations, or wireframes, that relied on existing vegetative screening were taken during leaf-off conditions. As previously mentioned, representative viewpoints were selected based on the feedback provided by municipal planning representatives and NYSDPS, NYSDEC, and NYSOPRHP staff, while also considering the other factors stated above. The photographic simulations are presented in Appendix D of the VIA (Appendix 24-A).

(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 of turbines were not prepared. Additionally, based on site-specific field investigation and rating panel review, the proposed O&M Facility is not anticipated to have a significant adverse visual effect, and therefore visual screening is not anticipated to be necessary

at this facility. The interconnection facilities (substations) are proposed in an area where few, if any, VSRs will be affected. However, these facilities do present contrast with the existing rural landscape, and will be visible from some adjacent residences. Screening in the form of perimeter plantings could be effective in reducing the visibility/visual impact of the substations. However, at the time of this application, the effectiveness and feasibility of such mitigation strategies is not known.

(7) Simulation Rating and Assessment of Visual Impact

As discussed in Section (a)(8) above, four registered landscape architects (two in-house and two independent) evaluated the visual impact of the proposed Facility.. Utilizing 11 x 17-inch digital color prints of the 16 visual simulations described above, the landscape architects (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, and viewer activity), and assigned quantitative visual contrast ratings on a scale of 0 (insignificant) to 4 (strong). The composite contrast score assigned by each LA was calculated for each viewpoint, and an average score for each viewpoint was determined. Copies of the completed rating forms are included in Appendix E of the VIA. 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 landscape architect was calculated for each viewpoint. The results of this process are summarized below in Table 24-4.

Table 24-4. Summary of Results of Contrast Rating Panel Review of Simulation

Viewpoint Number	Distance to Nearest Visible Turbine (m)	Distance Zone	Landscape Similarity Zone	Viewer Groups			Contrast Rating Scores[1]					
				Local Residents	Through Travelers/ Commuters	Tourists / Recreation	#1	#2	#3	#4	Average	Contrast Rating Result
26	3.6	Middle Ground	Village/City	●		●	0.8	0.9	1.8	2.0	1.4	Minimal/ Moderate
29	4.0	Middle Ground	Agricultural / Rural Residential	●		●	0.6	0.2	1.0	0.6	0.6	Insignificant/ Minimal
34	3.7	Middle Ground	Agricultural / Rural Residential	●	●		0.7	0.4	1.1	0.2	0.6	Insignificant/ Minimal
52	0.4	Near-Foreground	Agricultural / Rural Residential	●			3.3	3.9	4.0	3.0	3.6	Appreciable/ Strong
57	0.3	Near-Foreground	Agricultural / Rural Residential	●			2.7	4.0	3.8	2.4	3.2	Appreciable

64	0.3	Near-Foregrou nd	Agricultural / Rural Residential	●			2.8	3.7	3.8	1.7	3.0	Appreciable
71	0.4	Near-Foregrou nd	Hamlet	●			2.9	3.5	4.0	3.0	3.4	Appreciable/ Strong
98	1.7	Middle Ground	Agricultural / Rural Residential	●			1.3	1.5	1.1	0.6	1.1	Minimal
99	0.9	Foregrou nd	Agricultural / Rural Residential	●			3.5	3.8	2.0	1.6	2.7	Moderate/ Appreciable
109	7.9	Backgro und	Agricultural / Rural Residential	●			0.0	0.6	1.2	0.4	0.6	Insignificant/ Minimal
120	4.9	Backgro und	Agricultural / Rural Residential	●		●	2.3	1.7	1.6	2.4	2.0	Moderate
121	2.5	Middle Ground	Forest	●		●	2.8	2.8	2.9	2.7	2.8	Moderate/ Appreciable
123	0.3	Near-Foregrou nd	Agricultural / Rural Residential	●			2.1	4.0	2.6	3.2	3.0	Appreciable
124	0.4	Near-Foregrou nd	Agricultural / Rural Residential	●			3.2	3.7	2.7	2.8	3.1	Appreciable
127	1.4	Foregrou nd	Agricultural / Rural Residential	●			3.2	3.3	1.8	2.2	2.6	Moderate/ Appreciable
Total Average Contrast Rating Scores							2.1	2.5	2.4	1.9	2.3	Moderate/ Appreciable

[1] Contrast Rating Scale: 0.0 - 0.2 (Insignificant), 0.3 – 0.7 (Insignificant/Minimal), 0.8 – 1.2 (Minimal), 1.3 – 1.7 (Minimal/Moderate), 1.8 - 2.2 (Moderate), 2.3 – 2.7 (Moderate/Appreciable), 2.8 – 3.2 (Appreciable) 3.3 – 3.7 Appreciable/Strong), 3.8 – 4.0 (Strong).

As Table 24-4 indicates, the average overall composite contrast ratings for the 16 visual simulations ranged from 0.6 (Insignificant/Minimal) to 3.6 (Appreciable/Strong). The results of this evaluation are summarized as follows.

Agricultural/Rural Residential LSZ (Viewpoints 29, 34, 52, 57, 64, 98, 99, 109, 120, 121, 123, 124, 127 & 208)

The Agricultural/Rural Residential LSZ offers by far the greatest opportunities for view of the proposed Facility. Simulations of the Facility from viewpoints located within this LSZ received ratings from individual panel members that ranged from 0.0 to 4.0. Average contrast rating scores ranged from a low of 0.6 (Insignificant/Minimal) for Viewpoints 29, 34, and 109, to a high of 3.6 (Appreciable) for Viewpoint 52. Viewpoints 57, 64, 123, and 124 also received an impact rating above 3.0, suggesting that Appreciable visual impacts would occur. Simulations within the Agricultural/Rural Residential LSZ received an overall average contrast rating of 2.2. Scoring indicates a highly variable, but generally moderate level of impact can be expected within this LSZ. The low average contrast rating for Viewpoints 29, 34, and 109 can be largely attributable to the distance of the viewer from the Facility (3.7 to 7.9 miles) as well as the screening provided by intervening topography, vegetation, and built features. The density of

the vegetative screening will partially or fully conceal views of the proposed turbines even during leaf-off/winter conditions. The comments from the rating panel indicated that the turbines were generally indiscernible due to partial screening, the relatively small scale of the turbines resulting from distance, and lack of color contrast. It was also noted that the sky, foreground features, and existing structures remained visually dominant at all three viewpoints. Viewpoints 52, 57, 64, 123 and 124 received the highest average contrast ratings (3.0-3.6) due largely to the proximity of the turbines to the viewer (between 0.3 and 0.4 miles) and the number of turbines visible. Comments suggest that the turbines' seemingly scattered placement in the landscape, and scale contrast with existing vegetation and structures contributed to an Appreciable visual impact from these locations. Under these conditions the turbines become the dominant features of the landscape and focal points in the view.

Village/City LSZ (Viewpoint 26)

Views of the proposed Facility will be extremely limited from the Village/City LSZ due to the distance of the turbines from population centers, and/or the abundance of man-made features and surrounding vegetation that effectively screen views from these areas. The viewpoint simulation located within the Village/City LSZ received ratings from individual panel members that ranged from 0.8 to 2.0 with an average contrast rating score of 1.4. The low contrast rating received by Viewpoint 26 can largely be attributed to the distance of the viewpoint from the proposed Facility and the vegetative screening provided by the background tree line. Despite the large openness of the sports field, the Facility is at such a distance that blade tips are the only portion of the Facility anticipated to be visible. However, in most cases, viewshed analysis and field review indicates that open views from this LSZ will be very limited, and will usually feature the Facility in the background, where it will be less noticeable to the viewer and less likely to dominate the view. The presence of existing manmade and utility infrastructure within this LSZ further mitigates the contrast presented by the Facility.

Forest LSZ (Viewpoint 121)

As discussed in Sections 3.3.1 and 5.1.3, the Forest LSZ provides minimal opportunities for views toward the Facility due to the presence of dense vegetation and lack of available long-distance views. Generally, only the outer perimeter of forested areas, where they border other LSZs, provide opportunities for open views toward the Facility. Additionally, the general lack of topography within the VSA means viewers are rarely elevated above the horizon line, further limiting views. This screening effect of forest and woodlot vegetation is demonstrated in the wireframe overlays presented in Insets 5.2-3, 5.2-5, and 5.2-7. Viewpoint 121 illustrates a unique circumstance in which an observation tower allows for elevated views above the tree line. While rating panel members note that turbines are distant, clustered, and do not dominate the view, an average contrast rating of 2.8 reflects the fact that this viewpoint is taken from an observation tower with specific intent to look out over the landscape. While the dynamic westerly view remains fully intact, the proposed turbines interrupt the intended 360-degree panorama

the tower provides. Individual ratings range from 2.7 to 2.9. This result is not what would typically be expected in the Forest LSZ, where views are often fully or substantially screened. Due to the reduced effectiveness of forest screening and the sensitivity of this particular viewpoint, the contrast rating for Viewpoint 121 is anticipated to represent the high end of visual impact within this LSZ. Views similar to those seen in the wireframe overlays are much more likely within or adjacent to the Forest LSZ.

Hamlet LSZ (Viewpoint 71)

Viewpoint 71 is located within a portion of the Hamlet LSZ closest to the proposed turbines, and it is representative of potential near-foreground views. While approximately 89.6% of the Hamlet LSZ is in the background distance zone (over 4 miles), where Facility visibility is likely limited to turbine blades only, Viewpoint 71 is located approximately 0.4 miles from the nearest proposed turbine, and represents one of the most open views anticipated in this LSZ. Viewpoint 71 individual ratings range from 2.9 to 4.0 (average rating 3.4), attributable to the proximity of turbines, which results in substantial scale contrast, along with the land use contrast they present in a residential setting with minimal screening. Because Viewpoint 71 is also located near the edge of the Hamlet LSZ as it transitions to open agricultural land, it represents a worst case impact scenario from the Hamlet LSZ.

As indicated by the contrast ratings/summary in Table 5.3.1 (see also Appendix E), the rating scores provided by the four rating panel members were generally consistent with some individual variability in scoring specific viewpoints. This largely reflects how wind turbines are perceived by the general public. Although insignificant to minimal contrast was noted for some viewpoints by some of the panel members, the overall contrast presented by the Facility is moderate to appreciable. Rating panel results indicated that distance from the viewer, degree of scale contrast, and perceived change in land use were the primary sources of visual contrast with the existing landscape. The greatest perceived visual impact typically occurs at viewpoints where multiple turbines are visible at close distances and/or when the turbines appear out of character with existing land use. These conditions tend to heighten the Facility's contrast with existing elements of the landscape in terms of line, form, and especially scale. Factors mitigating visual impact within the VSA include 1) the abundance of mature and scattered forest land, which limits open views throughout the VSA, 2) the relatively flat topography that further reduces opportunities for long-distance views in many locations, and 4) the working agricultural character of much of the landscape where the Facility would be viewed.

As the rating panel results demonstrate, at distances greater than 2.5 miles, the turbines generally presented insignificant to minimal contrast with the existing landscape. Although some views at these distances received higher contrast ratings (e.g. Viewpoints 120 and 121), in most cases the turbines will have limited impact on viewers at these distances.

Although at times offering strong contrast with existing elements of the landscape, the proposed Facility will not necessarily be perceived by viewers as having an adverse visual impact. Even in views where rating panel members indicated appreciable contrast, they also discussed potential for increased visual interest in views that otherwise have low scenic quality or lack interesting focal points. Wind turbines are unlike most other energy and infrastructure facilities, such as transmission lines or conventional power plants, which are almost universally viewed as aesthetic liabilities. 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 a recent survey conducted by the U.S. Department of Energy of 1,706 residents across 24 states who were living within 5 miles of one or more of 250 wind power projects throughout the United States. The results of this survey indicated that only 8% of respondents living in proximity to wind turbines had a negative attitude toward the project. Seventy five percent of respondents living within a half-mile of one or more turbines had either a neutral of positive attitude toward them.
When asked, "Do you like the way the wind project looks?", 14% of respondents indicated "no", while 17% were neutral, and 69% said "yes". When asked, "To what extent do you feel annoyed by the change to the landscape of the local wind power project?", 73% of respondents indicated "not at all", and only 12% indicated that they were moderately or very annoyed by the change.

A study completed by Jefferson County Community College in Lewis County, New York (location of the 195-turbine Maple Ridge Farm Project in operation since 2006), revealed strong community support for wind power (JCCC, 2008, 2010, 2011, 2012). Approximately 90% of Lewis County residents who participated in these surveys expressed support for the development of additional wind energy projects (JCCC, 2010, 2011, 2012). Approximately 70% of respondents have consistently indicated that wind farms have had a positive impact on Lewis County (JCCC, 2008, 2010, 2011, 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 (JCCC, 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. The National Survey of Attitudes of Wind Power Project Neighbors is the largest survey its kind regarding neighbors' attitudes toward wind power projects. This survey included 1,705 homeowners living within 5 miles of one of 250 wind farms throughout the United States. Results from this study suggest that overall attitudes

regarding wind turbines are generally positive, even amongst individuals living as close as 0.5 mile from turbines. Only about 8% of the respondents had negative attitudes toward wind turbines within 5 miles of their home (Firestone et al. 2017).

Based on the rating panel results and analysis provided in the VIA, it is expected that within the APE the built Facility will generally result in moderate to appreciable impact on most viewers, with some minor individual variability.

(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 Section (a)(9), and Exhibit 15 of this Application. See Appendix 15-A for the Shadow Flicker Report.

REFERENCES

Business Enterprise & Regulatory Reform (BERR). 2009. Onshore Wind: Shadow Flicker [website]. Available at: http://webarchive.nationalarchives.gov.uk/20081013085503/http:/www.berr.gov.uk/whatwedo/energy/sources/renewables/planning/onshore-wind/shadow-flicker/page18736.html (Accessed September 2019). United Kingdom Department for Business Enterprise and Regulatory Reform.

Committee on Environmental Impacts of Wind Energy Projects (CEIWEP). 2007. Appendix D: A Visual Impact Assessment Process for Evaluating Wind-Energy Projects. In, *Environmental Impacts of Wind Energy Projects*, pp. 349-376. National Research Council, The National Academies Press, Washington, D.C.

Department of Energy and Climate Change (DECC). 2011. Update of UK Shadow Flicker Evidence Base: Final Report. Parsons Brinckerhoff, London, UK, p. 5.

Massachusetts Department of Energy Resources (DOER). 2011. Model Amendment to a Zoning Ordinance or By-law: Allowing Conditional Use of Wind Energy Facilities. Available at: http://www.mass.gov/eea/docs/doer/gca/wind-not-byright-bylaw-june13-2011.pdf (Accessed September 2019).

Environmental Design & Research, Landscape Architecture, Engineering, & Environmental Services, D.P.C. (EDR). 2019. *Historic Resources Report- Heritage Wind Project- Town of Barre, Orleans County*. EDR, Syracuse, NY.

Firestone, J., W. Kempton, and A. Krueger. 2009. *Public Acceptance of Offshore Wind Power Projects in the United States.* Wind Energy 12: 183-202.

Firestone, Jeremy, Ben Hoen, Joseph Rand, Debi Elliott, Gundula Hubner & Johannes Pohl. 2017. *Reconsidering barriers to wind power projects: community engagement, developer transparency and place*. Journal of Environmental Policy & Planning, DOI: 10.1080/1523908X.2017.1418656

Gipe, P. 1993. *The Wind Industry's Experience with Aesthetic Criticism*. Leonardo 26: 243-248.

Jefferson County Community College (JCCC). 2008. *Presentation of Results: Second Annual Lewis County Survey of the Community, December 2008.* Jefferson County Community College, Center for Community Studies, Watertown NY. Available at: http://www.sunyjefferson.edu/community-business/center-community-studies/annual-surveys-community.

JCCC. 2010. *Presentation of Results: Third Annual Lewis County Survey of the Community, February 2010.* Jefferson County Community College, Center for Community Studies, Watertown NY. Available at: http://www.sunyjefferson.edu/community-business/center-community-studies/annual-surveys-community.

JCCC. 2011. *Presentation of Results: Fourth Annual Lewis County Survey of the Community, February 2011*. Jefferson County Community College, Center for Community Studies, Watertown NY. Available at: http://www.sunyjefferson.edu/community-business/center-community-studies/annual-surveys-community.

JCCC. 2012. *Presentation of Results: Fifth Annual Lewis County Survey of the Community, February 2012.* Jefferson County Community College, Center for Community Studies, Watertown NY. Available at: http://www.sunyjefferson.edu/community-business/center-community-studies/annual-surveys-community.

Macaulay Land Use Research Institute (MLURI). 2010. *Perceptual Studies of Windfarms* [website]. Available at: http://www.macaulay.ac.uk/ccw/task-two/strategies.html (Accessed February 2020).

National Oceanic and Atmospheric Administration (NOAA). 2018. *What is LIDAR?* U.S. Department of Commerce, NOAA National Ocean Service. Available at: https://oceanservice.noaa.gov/facts/lidar.html (last updated June 25, 2018; accessed September 2018).

New York State Department of Environmental Conservation (NYSDEC). 2000. *Program Policy: Assessing and Mitigating Visual Impacts*. DEP-00-2. Division of Environmental Permits, Albany, NY.

Nielsen, F.B. 1996. *Wind Turbines and the Landscape: Architecture and Aesthetics*. Prepared for the Danish Energy Agency's Development Programme for Renewable Energy. 63 pp.

Pasqualetti, M.J., P. Gipe, and R.W. Righter (eds.). 2002. *Wind Power in View: Energy Landscapes in a Crowded World*. Academic Press, San Diego, CA.

Smardon, R.C., J.F. Palmer, A. Knopf, K. Grinde, J.D.Henderson and L.D. Peyman-Dove. 1988. *Visual Resources Assessment Procedure for U.S. Army Corps of Engineers.* Instruction Report EL-88-1. Department of the Army, U.S. Army Corps of Engineers. Washington, D.C.

Stanton, C. 1996. *The Landscape Impact and Visual Design of Windfarms*. ISBN 1-901278-00X. Edinburgh College of Art, Heriot-Watt University. Edinburgh, Scotland.

Sullivan, R. and M Meyer. 2014. *Guide to evaluating visual impact assessments for renewable energy projects*. Natural Resource Report NPS/ARD/NRR—2014/836. National Park Service, Fort Collins, Colorado.

Thayer, R.L. and C.M. Freeman. 1987. *Altamont: Public Perception of a Wind Energy Landscape*. Landscape and Urban Planning. Vol. 14, pp. 379-398.

Thayer, R.L. and H. Hansen. 1988. *Wind on the Land.* Landscape Architecture 78(2): 69-73.

United Stated Department of Agriculture (USDA) National Forest Service. 1995. *Landscape Aesthetics, A Handbook for Scenery Management*. Agricultural Handbook 701. Washington D.C.

USDA. 2020. Census of Agriculture [website]. Available at: https://www.nass.usda.gov/Publications/AgCensus/2017/Online_Resources/County_Profiles/New_York/ (Accessed January 28, 2020)

United States Department of the Interior (USDI) Bureau of Land Management (BLM). 1980. *Visual Resource Management Program*. U.S. Government Printing Office. 0-302-993. Washington, D.C.

United States Department of Transportation (USDOT) Federal Highway Administration (FHWA). 1981. *Visual Impact Assessment for Highway Facilities*. Office of Environmental Policy. Washington, D.C.

United States Department of Transportation (USDOT) Federal Highway Administration (FHWA). 2015. *Guidelines for the Visual Impact Assessment of Highway Projects*. Office of Environmental Policy. Washington, D.C.

Van de Wardt, J.W. and H. Staats. 1998. *Landscapes with Wind Turbines: Environmental Psychological Research on the Consequences of Wind Energy on Scenic Beauty*. Research Center ROV Leiden University.