Bluestone Wind Project

Case No. 16-F-0559

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 (1980), U.S. Department of Agriculture (USDA), National Forest Service (1995), the U.S. Department of Transportation (USDOT), Federal Highway Administration (1981, & 2015), U.S. Army Corps of Engineers (Smardon, et al., 1988), and the New York State Department of Environmental Conservation (NYSDEC) (2000). The components of the VIA include identification of visually sensitive resources, viewshed mapping, confirmatory visual assessment fieldwork, visual simulations (photographic overlays), cumulative visual impact analysis, and proposed visual impact mitigation. The VIA, included as Appendix ZZ 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 to be used for analysis of major electric generating facilities is defined as "*an area generally related to the nature of the technology and the setting of the proposed site. For large facilities or wind power facilities with components spread across a rural landscape, the study area shall generally include the area within a radius of at least five miles from all generating facility components, interconnections and related facilities and alternative location sites. For facilities in areas of significant resource concerns, the size of a study area shall be configured to address specific features or resource issues*."

During the early stages of the VIA preparation, a 10-mile extended study area was established for the purpose of identifying visually sensitive resources of national, regional and/or statewide significance. Although a 5-mile study area is typical in some instances, a 10-mile extended study area was used in order to identify any potential "significant resource concerns" beyond five miles that would warrant the use of a larger study area. A more inclusive inventory that adds locally significant visually sensitive resources was conducted for the area within five miles of the proposed Facility. As described below in Section (b)(3) and in Section 3.6 of the VIA, through the public outreach process, several resources were identified as locally significant that occur outside the 5-mile study area but within the 10-mile extended visual study area; therefore, the 10-mile extended study area was utilized going forward for the various visual analyses presented herein (e.g., visual fieldwork, viewshed analysis, and simulations). However, the 5-mile radius study area was also retained for the purposes of discussing locally significant visually sensitive resources and because the area within 5 miles of a facility typically represents the

area within which significant visual effects may occur. The 5-mile and 10-mile extended study area boundaries extend to the Pennsylvania border and encompasses areas within New York State only. Both the 5-mile and 10-mile extended visual study areas are depicted on Figure 3 of the VIA.

The visual study areas lie within the Northern Allegheny Plateau physiographic region of New York State (Bryce et al., 2010). This region is glacially smoothed with flattened hilltops and wide stream valleys. The form can generally be described as an elevated plateau of rolling hills, open valleys, and low mountains covered by till and dissected by stream valleys. The dissection by both water and ice erosion has given the upland a somewhat rugged relief. The plateau is thought to represent ancient erosion surfaces and has a rather flat-topped appearance when viewed from a distance. The plateau transitions to relatively flat valleys and troughs, some containing large lakes and major rivers, such as the Susquehanna and the West Branch of the Delaware River, and others that include smaller wetlands, ponds and streams. Both of the major river valleys run generally north to south through the visual study areas. The Susquehanna River is west of the proposed turbine array; a tributary of the West Branch of the Delaware River cuts through the eastern portion of the Facility Site.

Vegetation throughout the study areas is dominated by dense, mature forest with agricultural and successional old fields interspersed within the landscape. Forestland is prevalent throughout the more elevated portions of the study areas and on steeper slopes. Forest is primarily deciduous, consisting of oak forest on drier slopes and northern hardwoods with some native evergreens and conifers (white pine and hemlock) mixed in on north slopes, ravines, and within riparian areas. Forestland can also be found in woodlots, hedgerows, and wooded wetlands abutting the more agricultural portions of the study areas. Open fields occur primarily in the northwestern corner of the study areas, on some level hilltops and within the major valleys. The study areas lack large commercial farms, so these agricultural/open fields are primarily associated with smaller farmsteads, which typically include a single-family residence and associated farm structures.

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 study area will provide a useful framework for the analysis of the Project'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 Forest Service, 1995; USDOT Federal Highway Administration, 1981, 2015; USDI Bureau of Land Management, 1980). Within the visual study area, five distinct LSZs were defined. The approximate location of these zones is

illustrated in Figure 5 of the VIA (Appendix ZZ). LSZs within the study area are described in more detail in the VIA and include the following:

- Forest
- Rural Residential/Agricultural
- Open Water
- Village
- Transportation Corridor

(2) Visibility of the Facility

The VIA includes an analysis of potential visibility and identifies locations within the visual study area where it may be possible to view the proposed wind turbines, meteorological (met) towers, substations and O&M building. This analysis includes 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. 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 visual field review in the study area on multiple dates in March through May 2018 (March 27, April 29, and May 24). During these field visits, EDR staff members drove public roads and visited public vantage points within the 10-mile extended study area to document locations from which the turbines and other Facility components would likely be visible, partially screened, or fully screened. This determination was made based on the visibility of the distinctive Facility Site ridges/landforms, as well as existing tall structures (such as silos, and temporary meteorological towers) on or around the Facility Site, which served as locational and scale references. These site visits resulted in photographs from 117 representative viewpoints within the 10-mile extended study area. The viewpoints document potential visibility of the Facility from the various LSZs, distance zones, directions, visually sensitive resources, and areas of high public use throughout the visual study area. A representative photograph documenting the general view towards the Facility Site from each viewpoint is included in Appendix B of the VIA and the location of each viewpoint is shown on Figure 9 of the VIA.

During the field surveys, photographs were taken with a 30.4 megapixel (MP) Canon EOS 5D Mark IV with a fixed focal length 50 mm lens, and a 24.1 MP Nikon D7100 and with a lens setting between 28 and 35 mm (equivalent to between 45 and 55 mm on a full frame 35 mm camera). A 50 mm focal length most closely approximates the relative scale and perspective relationship of objects in the view (minimal distortion between foreground, middle ground, and background elements). This focal length is the standard used in visual impact assessments because it most closely approximates normal human perception of spatial relationships and scale in the landscape (CEIWEP, 2007). Viewpoint locations were determined using hand-held global positioning system (GPS) units, high resolution aerial photographs, and high-resolution lidar data (to determine elevation). The time and location of each photograph were documented on all electronic equipment (camera, GPS unit, etc.) and noted on field data sheets. Viewpoints photographed during field review generally represented the most open, unobstructed available views toward the proposed Facility.

Field review confirmed that the Facility visibility from each of the LSZs did, in fact, match the predictions revealed by the viewshed analysis mapping (see VIA Figure 7). The low percentage of potential views of the proposed Facility was backed up by the following characteristics observed during field review: curving valleys, forested hillsides and ridgelines, limited long distance views, and vegetated roadsides. These characteristics, which are widespread throughout the 10-mile extended study area, also lead to the conclusion that actual Facility visibility is likely to be more limited than suggested by the viewshed mapping. The results of EDR's field review, organized according to Landscape Similarity Zone, are summarized below:

Forest LSZ

Field review confirmed that actual visibility of the Facility from sensitive resources, public areas and roadways within the Forest LSZ, which covers a large majority of the study area, is very limited. Photographs of typical views from the Forest LSZ are included in Section 3.3.1 of the VIA (see Inset 2). Even under leaf-off conditions, the density of tall forest vegetation in forest stands and woodlots block nearly all outward views toward the Facility Site. Residential properties that were observed from the public roadways within this zone are often associated with a small yard clearing. Where turbines are proposed in the foreground, residences may have potential visibility of the Facility; however, at the middle ground and background distances, it is likely that the surrounding dense vegetation will screen outward views. A few observed properties that had larger clearings or were built on steeper slopes may have visibility of the proposed turbines through their individual lawns/clearings. Visually sensitive resources in this LSZ where field review confirmed no (or minimal) Facility visibility include Oquaga Creek State Park (Arctic Pond), Nathaniel Cole Park, Finger Lakes Trail (FLT), Beals Pond State Forest, Beaver Pond, Marsh Pond State Forest, and Melondy State Forest (see Appendix C of the VIA).

Field review from the Oquaga Creek State Park confirmed what the results of the viewshed analysis showed. Of the 1,273 total acres within the park only 80 acres or 6.3% have potential turbine visibility, and 3.9% have potential Federal Aviation Administration (FAA) warning light visibility. The areas of the park associated with potential visibility were concentrated in the clearing above Arctic Lake, adjacent to the west side of the state park road before the small creek crossing. During the field review, the Orange Ski Trail and yellow unnamed trails were traversed and documented. See Sheet 13-15 of VIA Appendix D for the visual simulation that conveys the potential visibility, and Section 5.2.1 of the VIA for the analysis of this view. As part of the field review, the camping area loop roads were traveled and assessed as well. The field review confirmed the conclusion of the viewshed analysis that open views toward the Facility were not available due to the dense forest cover and topography of the park grounds. The area of the park that will experience the largest number of users is the beach and picnic area associated with Arctic Lake; this is also the only portion of the park that is open to users in the winter months. Field review confirmed that visibility from this area of the park will be minimal to none during both summer and winter months. See Sheet 4 of VIA Appendix E for a wireframe rendering of the conditions found at the lake's surface. The wireframe rendering shows that the surrounding forested hills successfully screen the Facility turbines from these heavily used locations.

Field review of the Nathaniel Cole Park showed that foreground and middle ground topography and vegetation would screen the majority of the park lands. This includes the open play areas, picnic shelters, group camping area, and nature trail, which all fall within the vegetated or forested areas. Potential for turbine visibility was observed from the beach area, as a view across the open water provides the most open views. To ensure analysis of potential impact, a wireframe rendering was produced for the beach area. The results showed that there was a potential for the blade tip of one turbine to be visible. At a distance of approximately 8 miles the blade tip would be hard to discern in the tree tops and would not be noticed by the users of the park (Sheet 5 of VIA Appendix E).

A portion of the FLT that travels north to south through the Beals Pond State Forest was hiked and documented during field review. In general, the FLT remains in the forest as it traverses the northeastern portion of the visual study area with limited on road sections. The Beals Pond State Forest section of the FLT offers an identified scenic overlook that was the destination of the field review hike. The trail was well maintained and was a gradual uphill from the parking area to the overlook. The overlook was well marked with a small memorial wooden bench that provided open long-distance views in the direction of the Facility, which were documented. Since field review could not confirm that the Facility would not be visible from the overlook, a wireframe rendering was created. The wireframe rendering confirmed that the turbines will be screened by the intervening topography (see Sheet 6 of VIA Appendix E).

Field review from the state forests within the 10-mile extended study area showed that views are generally limited to roadway corridors, small forest clearings, and open water associated with small ponds, wetlands and marshes. As shown in Inset 14 of the VIA, even along roadways and at overlooks and clearings, outward views from interior forest areas are fully or substantially screened. The viewshed analysis indicated that only 240 acres of the total 23,012 acres, or just over 1%, of all the state forest lands had potential visibility of the proposed Facility. Field review confirmed that even this percentage overestimated the potential visibility to users of the resources because areas with potential visibility are located away from the formally designated trails and seasonal forest roads where public use is most concentrated. For an analysis of all 20 state forests that have part or all of their lands in the visual study area, see Appendix J of the VIA.

Field review also confirmed the results of the viewshed analysis showing that the local public road networks within the immediate vicinity of the turbines were screened by dense roadside vegetation and, to a lesser extent, topography. Roads in the Town of Windsor, such as Mt. Carmel Road, Hartz Road, Cresson Hill Road, and Fox Farm Hill Road, will have limited, if any, view of the turbines, despite close proximity to the proposed Facility. This is due to the fact that the dense vegetation creates a tunnel effect which only allows for views down the road corridors. Also, the topography of the area means that the roadways are quite curvilinear and have short straightaways that do not align with Facility components.

Rural Residential/Agricultural LSZ

Field review indicates that potential Facility visibility within the Rural Residential/Agricultural LSZ is highly variable and depends greatly on what portion of the visual study area the viewpoint is located. Whether it is an adjacent valley or a hillside or a distant agricultural field, visibility will depend on the site conditions at each individual viewpoint. Photographs of typical views from the Rural Residential/Agricultural LSZ are included in Section 3.3.2 of the VIA. In this region, the siting requirements of a wind energy facility dictate that the turbines be sited on hilltops or ridgelines, outside of valley areas. In the valleys within the visual study area, where outward visibility is not screened by foreground vegetation or structures, the most dominant visual characteristic is typically the adjacent ridge and/or series of hills and ridges that define the valley walls. The portions of the Rural Residential/Agricultural LSZ that are agricultural often provide open views across fields framed by forested hillsides. When located in close proximity to the proposed Facility, such locations provide unobstructed views of nearby wind turbines located on the adjacent ridgetops (see Appendix D of the VIA, Sheets 16-18). However, the ridges that define the valley walls will also be effective in screening views of the more distant turbines and in some cases, of the entire Facility.

While driving the roadways within this LSZ during the field review, it was observed that depending on direction, roadside vegetation, and character of the road layout, potential Facility views can include any number of turbines at varying distances. These are short, fleeting views that are constantly changing around each curve, which makes for a lower visual impact on transient users of this LSZ. Areas where residential users are concentrated tend to be screened (or partially screened) from longer distance views by agricultural hedgerows, yard plantings, small forest stands, and/or residential and agricultural buildings

Visually sensitive resources located in the Rural Residential/Agricultural LSZ that may afford views of the Facility focus on heavily traveled north/south roadways (i.e., State Route 8, State Route 49, and State Route 79). Additional resources associated with these road corridors include State and local fishing/river access, cemeteries, and a scattering of National Register of Historic Places (NRHP)-listed and NRHP-eligible sites.

Field review of State Route 79 south of State Route 17/Interstate 86 confirmed that the adjacent forested ridges in the middle ground screen the open views towards the Facility. State Route 79 follows the flow of the Susquehanna River and courses through the same valley floor. An abundance of agricultural land within the valley provides opportunities for long distance open views. A wireframe rendering of the valley was drafted at one of these readily available, long distance views (see Sheet 8 of VIA Appendix E). The wireframe showed the potential for blade tip visibility from the blade tip of one turbine. Views similar to this wireframe are expected; however, views of the Facility will be variable, as the road curves to follow the river channel, and roadside vegetation goes from scrub/brush to forest stand to suburban landscape plantings to open agricultural fields. The constant landscape feature that dominates this area is the valley hills and forested slopes of the ridgelines.

Open Water LSZ

Field review of the areas that make up the Open Water LSZ within the study area indicated that Facility visibility is likely to be limited, with the exception of Marsh Pond. Photographs of typical views from the Open Water LSZ are included in Section 3.3.6 of the VIA (see Inset 20). Waterfront and open water areas offer relatively open outward views when compared to other landscape types due to expanse of open water and the lack of screening by foreground topography, vegetation or buildings. This holds true for the larger lakes in the visual study area; however, the other water bodies in the 10-mile extended study area are largely limited to small ponds and impoundments, or meandering rivers where long-distance views are screened by shoreline trees and adjacent hills. Waterbodies that are included in this LSZ and that were visited during the field review include Cannonsville Reservoir, Arctic Lake, Clarks Pond, Beaver Pond, Marsh Pond, Nathaniel Cole Park Lake, White Birch Lake, Beaver Lake, Oquaga Lake, Susquehanna River, and the West Branch of the Delaware River. Viewshed analysis

suggested that potential Facility visibility from Oquaga Lake and White Birch Lake was limited to the southern shoreline.

Field review of White Birch Lane and a wire frame rendering confirmed that the proposed turbines will not be visible from the water's surface (see VIA Inset 21). The screening effects on users of this resource comes from the mature shoreline vegetation and the fact that water bodies are set down into the landscape, limiting open views outward.

The largest area of the Open Water LSZ that can be found within the visual study area is the Cannonsville Reservoir. The total acreage of the reservoir within the visual study area is 4,215.5 acres, with 223 acres or 5.3% having potential visibility. The viewshed showed the largest concentration of potential views to be from the Rood Creek boat launch. Field review confirmed that the viewshed's prediction that the proposed Facility will likely be visible from the upper shoreline and not the surface of the reservoir. A wireframe rendering was completed from this location (see Sheet 3 of VIA Appendix E) which supports the conclusion that the majority of the surface water will not have visibility of the proposed Facility. This is due to the extreme topography present at the shoreline, the lack of any cleared openings, and a densely vegetated shoreline.

Village LSZ

Actual visibility of the Facility from the Village LSZ, as confirmed by field review, is anticipated to be variable. Photographs of typical views from this LSZ are included in Section 3.3.4 of the VIA. In most portions of the villages of Afton, Deposit, and Windsor, buildings, street trees and suburban yard vegetation effectively screen outward views. The limited right-of way (ROW) width or distance between residences on many village streets, combined with mature street vegetation, constrict views down street corridors as well. In these villages, visibility of the Facility will often be limited to partially screened views of turbines in gaps between buildings and vegetation. Field review showed that potential visibility from this LSZ is concentrated at the entrances and exits of the street grid, where relatively large areas of unvegetated land (e.g., parks, ponds, school grounds, and athletic fields) occur, or open agricultural areas that are directly adjacent to the village. Appendix B of the VIA includes representative views from Afton, Deposit, and Windsor.

This LSZ is the location of most of the NRHP-listed and eligible properties as well as the two historic districts that are present in the visual study area. Views available from these visually sensitive sites will depend on their location and degree of foreground screening. As represented by the photos included in VIA Inset 17, views from areas of dense development will be partially screened or include a limited number of turbines (e.g., narrow views available between nearby structures or through gaps in vegetation), while open views are more likely from historic sites on the periphery of the smaller villages and hamlets.

The Village of Windsor Historic District (90NR00091) was visited during field review and potential views towards the Facility were documented. However, field review was not able to confirm that there was no visibility from the district, so a wireframe rendering was produced. In the rendering it is clear that the Facility turbines will remain below the intervening ridge just east of the village. See Sheet 1 in VIA Appendix E for the wireframe rendering.

The historic State Theater (90NR00089) in the Village of Deposit was visited during field review and analyzed for potential visual effect from the proposed Facility. Field review confirmed that views were available between small openings in the street vegetation and village buildings and where parking lots provided open space. To evaluate the view from the main entrance to the State Theater on Front Street, a wireframe rendering was created. The rendering shows that the turbine nacelle and 1/3 of the tower of one turbine will be visible above the intervening forested hill. The remainder of the Facility turbines fall behind this hill and are effectively screened from the view.

Transportation Corridor LSZ

Field review revealed that potential Facility visibility from the Transportation Corridors LSZ will be highly variable. Due to their length and location within the visual study area, these road corridors run through a variety of different settings, from settled residential areas to agricultural valleys and upland areas of forest cover. Photographs of typical views from the Transportation Corridors LSZ are included in Section 3.3.5 of the VIA. Field review confirmed that foreground, middle ground, and background views to the Facility Site are present along different sections of State Route 17/Interstate 86 and Interstate 88. Given the relative proximity of State Route 17/Interstate 86 (closest point 0.36 miles distant) in comparison to Interstate 88 (closest point 5.33 miles distant), visibility of the proposed turbines from visually sensitive resources along the Interstates will be variable. For example, foreground views of portions of the Facility will be possible from the eastbound rest area in the Town of Windsor as the turbines rise above the adjacent foreground ridges, while long distance views from the westbound rest area in the Town of Hancock are screened by intervening topography.

(3) Visibility of Above-ground Interconnections and Roadways

Potential visibility of the collection and point of interconnection (POI) substation, as indicated by the viewshed analysis, is illustrated in Figure 8 in the VIA (see Appendix ZZ). This analysis, based on 60-foot maximum structure height and topography alone, indicates that some portion of the stations would be screened from view from approximately 69.1% of the 1-mile radius study area. Visibility is limited by the valley location of the stations and the relatively high topographic relief within the 1-mile study area. The stations are located at the northern end of Big Hollow, and the surrounding ridgelines limit visibility from extending beyond its borders. Visibility is indicated

from Big Hollow Road and the adjacent Big Hollow Creek headwater stream. Two other Big Hollow Creek headwater streams that occur within the 1-mile study area are screened from view by intervening topography.

When vegetation and structures are factored into the analysis, potential visibility of the proposed stations is further reduced to approximately 10.8% of the 1-mile study area. Views from the remaining 89.2% of the study area are screened by the combination of topography, forest/tall vegetation and the limited number of structures that occur therein. Remaining areas of potential station visibility are limited to the abandoned and successional fields that extend to the north and southeast of the proposed collection and POI substation locations. Within these fields, visibility will be intermittent in some places due to the presence of roadside vegetation, hedgerows, and areas of successional growth sufficient enough to provide some level of screening. Visibility will also extend a short distance from the stations to the west along a corridor that will be cleared for the installation of the collection line. This analysis indicates that the stations will be visible from Big Hollow Road and the adjacent headwater stream to the north of their access point but will be screened from view from Big Hollow Road and the stream extending south of the access point. See Section 5.1.2 of the VIA for a discussion of the substation viewshed analysis.

Clearing limits at the time of the viewshed analysis were assumed to be up to a 530-foot diameter at each turbine and a 100-foot wide corridor along access roads in forested areas.

The only above-ground electrical collection line associated with the Facility is a short length of aboveground transmission line connecting the collection and POI substations. The visual impact of this line is addressed in the simulation for the substations discussed above and in Section 5.1.2of the VIA.

(4) Appearance of the Facility Upon Completion

To show anticipated visual change associated with the proposed Facility, high-resolution computer-enhanced image processing was used to create realistic photographic simulations of the proposed turbines, met towers and associated clearing from each of the 19 selected viewpoints. The photographic simulations were developed using Autodesk 3ds Max Design® to create a simulated perspective (camera view) to match the location, bearing, and focal length of each photograph of existing conditions. Existing elements in the view (e.g., topography, buildings, roads, existing turbines) were modeled based on aerial photographs and digital elevation model (DEM) data in AutoCAD Civil 3D®. A three dimensional (3-D) topographic mesh of the landform (based on DEM or digital surface model [DSM] data) was then brought into the 3-D model space. At this point, minor adjustments were made to camera and target location, focal length, and camera roll to align all modeled elements with the corresponding elements in the photograph. This assures that any elements introduced into the model space (e.g., the proposed

turbines) will be shown in proportion, perspective, and proper relation to the existing landscape elements in the view. Consequently, the alignment, elevations, dimensions and locations of the proposed Facility structures will be accurate and true in their relationship to other landscape elements in the photograph.

For the purposes of this analysis, it was assumed that all turbines would be Vestas V150 (4.2 MW) machines with a hub height of 130 meters (427 feet) and a rotor diameter of 150 meters (492 feet), and a total height of 673 feet. All turbine rotors were modeled facing into the prevailing wind (i.e., oriented to the southwest). Clearing limits at the turbines, represented in the simulations were assumed to have a diameter of between 300 and 400 feet based on engineering Facility clearing limits. The met towers were assumed to be 130- meter self-standing lattice structures. The substation equipment will have a maximum height of 60 feet, at the lightning masts/rods with the majority of the equipment remaining below 30 feet. The associated buildings are represented as pole barns typical for the area.

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.

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 Project site and have limited visual impact.

Once the proposed Facility was accurately aligned within the camera view, a lighting system was created based on the actual time, date, and location of the photograph. Using the Mental Ray Rendering System® with Final Gather and Mental Ray Daylight System® within the Autodesk 3ds Max Design® 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 6 of the VIA (see Appendix ZZ).

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

(5) Lighting

The potential visibility of FAA warning lights for the proposed turbines is described in Section 5.2.3 of the VIA and Section (b)(1) of this Exhibit. VIA Figure 7, Sheet 2 illustrates FAA warning light visibility within the 10-mile extended study area. Nighttime photos from the Fenner Wind Power Facility, which is located in Madison County, New York, and has been in operation since 2001, are included in Appendix I of the VIA to illustrate the type of nighttime visual impact that could occur at certain viewpoints. The contrast of the aviation warning lights with the night sky could be appreciable in dark, rural settings, and their presence suggests a more commercial/industrial land use. Viewer attention is drawn by the flashing of the lights, and any positive reaction that wind turbines engender (due to their graceful form, association with clean energy, etc.) is lost at night. While generally not an issue from roads and public resources visited almost exclusively during the day (parks, trails, historic sites, etc.), turbine lighting could be perceived negatively by area residents who may be able to view these lights from their homes and yards in dark, rural settings. However, this impact will be limited along major roadways and in areas of more concentrated human settlement, where nearby ridgelines will generally screen views of large numbers of turbines and existing light sources will limit the visibility and contrast of the aviation warning lights.

It should be noted that the size and brightness of the lights depicted in the representative photos of the Fenner Wind Power Facility (see VIA Appendix I) are due to the use of a long exposure during photography to ensure that the lights were visible in the photographs. As a result, the photographs are not representative of what would be seen with the naked eye. It should also be noted that the Fenner example has one light per turbine where the proposed Facility will have two lights per current FAA requirements. Depending on angle of view, distance and direction the turbine is facing, the lights will appear as one. See Appendix I of the VIA for representative nighttime photos.

Lighting at the substations and O&M building will be kept to a minimum, and turned on only as needed, either by switch or motion detector. Final exterior lighting at Facility components will be described in the Facility Exterior Lighting Plan.

(6) Photographic Overlays

To show anticipated visual changes associated with the proposed Facility, high-resolution computer-enhanced image processing was used to create realistic photographic simulations of the proposed Facility from each of the 21 selected viewpoints. See Section (a)(4) above for discussion of the methodology and specific software packages that were used for creating the simulations. The VIA (Appendix ZZ) discusses each of the visual simulations for the Facility at length in Section 5.0 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 in Appendix I of the VIA. As shown on these photographs, anticipated visual effects during construction include the following:

- 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, including specialized transportation vehicles. For instance, wind turbine blades are transported on trailers with one blade per vehicle, and tower sections are typically transported in three to four sections, depending on the supplier (one section per truck). The size of the proposed blades and tower segments 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 some public roads with an aggregate roadway surface will be required to accommodate the turning movements of delivery vehicles in certain locations (e.g., road intersections). These temporary improvements will generally be removed at the completion of construction. Public roads may also be damaged by the heavy vehicle traffic during the course of construction. However, as required by road use agreements, all such damage will be repaired at the end of construction.
- 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, all of which will be removed, and the site restored, at the end of construction.

- Facility access roads will be sited on existing forest roads wherever possible, and areas of disturbance will be confined to the smallest area possible. However, construction of access roads 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 and compacted, and surfaced with approximately 12 inches of gravel or crushed stone. During construction, access road corridors will be cleared to a width of up to 100 feet. The roads themselves will be 16 feet wide with a gravel surface and compacted shoulders to accommodate construction vehicles and component deliveries to the turbine sites. Following construction, the 16-foot gravel surface will remain in place for Project maintenance purposes, and adjacent vegetation will be allowed to regrow to within 10 feet of the road surface. The access roads generally take on the appearance of farm lanes.
- Once the roads are complete for a particular group of turbines sites, turbine foundation construction will commence on that completed access road section. Initial activity at each tower site will typically involve clearing and leveling (as needed) up to a 265-foot radius around each tower location. Topsoil will be stripped from the excavation area and stockpiled for future site restoration. Following topsoil removal, tracked excavators will be used to excavate the foundation hole. Subsoil and rock will be segregated from topsoil and stockpiled for reuse as backfill. Once the concrete is poured and sufficiently cured, the excavation area around and over it is backfilled with 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. Otherwise, the turbine sites will be revegetated. Because turbines are typically well removed from public roads and adjacent residences, visibility of earth work at these sites is generally limited.
- Wherever possible, underground collection lines will be installed by direct burial, which involves the installation of bundled cable (electrical and fiber optic bundles) directly into a narrow cut or “rip” in the ground. The rip disturbs an area approximately 24 inches wide with bundled cable installed to a minimum depth of 36 inches. Where direct burial is not possible, an open trench will be excavated. Using this installation technique, topsoil and subsoil are excavated, segregated, and stockpiled adjacent to the trench. Following cable installation, the trench is backfilled with suitable fill material and any additional spoils are spread out or otherwise disposed of properly. Following installation of the buried collection line, areas will be returned to pre-construction grades and revegetated.
- Turbine assembly involves the use of large tracked 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 assembly 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, by placing the

rotor onto the nacelle. The visibility of these cranes will be comparable to the visibility of the proposed turbines (in terms of height). However, use of crane equipment at each turbine site will be limited to the time necessary to complete turbine erection (generally 1 to 2 days).

- Restoration of temporarily disturbed areas will be achieved by restoring original grades (where feasible) and seeding with a native seed mix to reestablish vegetative cover in these areas. Other than in active agricultural fields, native species will be allowed to revegetate these areas. This will minimize visual impacts associated with soil and vegetation disturbance during construction and operation.

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

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

- *Form, Line, Color, and Texture*: These are the four major compositional elements that define the perceived visual character of a landscape, as well as a facility. Form refers to the shape of an object that appears unified; often defined by edge, outline, and surrounding space. Line refers to the path the eye follows when perceiving abrupt changes in form, color, or texture; usually evident as the edges of shapes or masses in the landscape. 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 facility, 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 facility components, and the design elements of form, line, color, texture, and scale.

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

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

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

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

- *Movement*: Moving facility components can make them more noticeable, but in the case of wind turbines, have also been shown to 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 F of the VIA, and the results of the evaluation process are summarized in VIA Table 8. A summary of the results is contained in Section (b)(7) below.

(9) Operational Effects of the Facility (i.e., Shadow Flicker)

To determine operational effects of the Facility, Epsilon Associates, Inc. (2018) conducted a shadow flicker analysis using WindPRO software. The analysis looked at the potential shadow flicker occurrence on nearby potential receptors, identifying the number of potential receptors and predicted annual hours of shadow flicker at each receptor within the shadow flicker study area. Potential receptors include any known residential structures (both participating and non-participating), schools, office buildings, storefronts, or known public recreation areas (e.g., campgrounds, trailheads within State Forest land) within a 10-rotor diameter area (1,500 meters) around the proposed turbines. Shadow flicker was previously discussed in Exhibit 15(e)(4) and the Shadow Flicker Report is provided as Appendix T to this Application. Below is a summary of the shadow flicker analysis.

Broome County, the Town of Windsor, and the Town of Sanford do not have any shadow flicker regulations applicable to wind turbine operations. In addition, Section 1001.24(9) does not list quantitative shadow flicker limits. However, in a previous proceeding for the siting of a wind project, the Siting Board established a threshold of 30 hours annually at non-participating residential receptors as a condition to the operation of the facility (see Application of Cassadaga Wind LLC, Order Granting Certificate of Environmental Compatibility and Public Need, With Conditions, Case No. 14-F-0490, dated January 17, 2018; Condition 30). Consequently, a design goal of 30 hours per year at non-participating sensitive receptors has been established for purposes of assessing shadow flicker at the proposed Facility. This goal is consistent with the condition established by the Siting Board in the Cassadaga proceeding as well as with guidance and regulations developed by various states and countries. For example, Connecticut Regulation Section 16-50j-95(c) limits the annual duration of shadow flicker to 30 hours at any off-site occupied structure in Connecticut, and a German court has ruled that 30 hours of actual shadow flicker per year was acceptable at a neighbor's property in Germany (Epsilon, 2018).

The shadow flicker analysis for the proposed Facility used *WindPRO 3.1.633* software and the associated Shadow module, which is a widely accepted modeling software package developed specifically for the design and evaluation of wind power projects. The Shadow Flicker Analysis evaluated the impacts from five turbine models under consideration for the Facility; however, the turbine with the largest rotor diameter (Vestas V150-4.2) was used to calculate the 10-rotor diameter study area that was used for all analyses. Input variables and assumptions used for shadow flicker modeling calculations for the proposed Facility include:

- Latitude and longitude coordinates of the 33 proposed wind turbine sites (provided by the Applicant).
- Latitude and longitude coordinates for 392 potential receptors located in the 10-rotor diameter Study Area (1,500 meters) for the largest turbine under consideration for the Facility. The receptors include residential structures (both participating and non-participating), schools, office buildings, storefronts, and known public recreation areas (e.g., campgrounds, trailheads within State Forest land) located within the 10-rotor diameter Study Area. The location of each receptor is mapped on Figure 6-2 in Shadow Flicker Report in Appendix T.
- USGS 1:24,000 topographic mapping and USGS 10-meter resolution DEM data.
- The rotor diameter and hub height for the turbine models under consideration for the Facility.
- Annual wind rose data (provided by the Applicant) to determine the approximate directional frequency of rotor orientation throughout the year.
- Monthly sunshine probabilities from a publicly available historical dataset for Binghamton, New York, from the National Oceanic and Atmospheric Administration's (NOAA) National Centers for Environmental Information.

A summary of the projected shadow flicker at each of the 392 receptors located within 1,500 meters of all proposed turbine locations for each turbine model under consideration for the Facility is presented in Table 24-1, which groups anticipated shadow flicker exposure into ranges grouped by hours per year. See the full Shadow Flicker Report in Appendix T for more specific results by receptor, including Appendix B of the Shadow Flicker Report which presents anticipated shadow flicker exposure in hours per year, and Appendix D of the Shadow Flicker Report which presents anticipated shadow flicker exposure in number of days per year and maximum minutes per day.

Table 24-1. Predicted Shadow Flicker Summary by Turbine Model (Hours per Year)

Predicted Annual Shadow Flicker	Number of Receptors by Turbine Model				
	General Electric GE 3.8-137	Vestas V150-4.2[1]	Nordex N149/4500	Senvion 4.2 M148	Siemens Gamesa SG4.2-145
0 hours	195	191	192	192	193
<10 hours	117	101	101	100	102
10-30 hours	62	73	74	74	77
>30 hours	18	27	25	26	20

[1]The Vestas V150-4.2 contained the largest rotor dimeter at 150 meters and represents the most conservative analysis.

The Vestas V150-4.2 turbine represents the largest turbine model under consideration and would result in the greatest amount of annual duration of shadow flicker among all of the turbines included in the analysis. The preliminary modeling results showed that 27 receptors would be expected to have over 30 hours of shadow flicker per year. Fourteen of those 27 receptors are on participating parcels, which the remaining 13 are on non-participating parcels. The maximum expected annual duration of shadow flicker at a receptor on a participating parcel is 62 hours 1 minute, while the maximum expected annual duration of shadow flicker at a receptor on a non-participating parcel is 56 hours 45 minutes.

However, this analysis is conservative in several respects. First, modeling locations were treated as "greenhouses" (i.e., did not take into account the actual location and orientation of windows). Secondly, the model did not consider the screening effects associated with existing obstacles such as barns and vegetation. Based on the results of the preliminary model, field visits were conducted to the 13 non-participating parcels that showed preliminary shadow flicker results of more than 30 hours to obtain information about obstacles and window orientation. Field review showed that two of the 13 receptors are located in heavily wooded areas that would significantly reduce shadow flicker impacts. Vegetation and/or structures in the vicinity of the other 11 non-participating receptors do not result in quantifiable reductions in expected annual shadow flicker. Therefore, after incorporating this additional information into the model, a total of 11 non-participating receptors are predicted to experience shadow flicker for more than 30 hours per year.

In addition, many of the modeled shadow flicker hours are expected to be low in intensity because they would occur during the early morning or late afternoon hours when the sun is low in the sky. As the sun sinks below the horizon, more of its light is scattered by the atmosphere, which has the effect of dampening its brightness and therefore reducing its ability to cast dark shadows (EMD, 2013).

More generally, as discussed in the shadow flicker report in Appendix T of the Application, shadow flicker impacts are generally an annoyance issue and not a health effects concern. According to the Epilepsy Foundation, "Generally, flashing lights most likely to trigger seizures are between the frequency of 5 to 30 flashes per second (Hertz)" (Epilepsy Foundation, 2017). Of the proposed wind turbines under consideration for this Facility, the maximum rotational speed of 13.6 revolutions per minute (rpm) corresponds to a frequency of 0.7 Hz, which is well below the frequency identified by the Epilepsy Foundation as a potential concern.

In summary, significant adverse shadow flicker impacts are not anticipated. Of the 392 receptors initially studied, only 27 receptors predicted to exceed the 30-hour threshold, 13 of which are non-participating receptors. Once site-specific factors (window orientation, obstacles) were modeled, only 11 non-participating sites were predicted

to exceed the 30-hour threshold. While the Applicant seeks to minimize shadow flicker exposure at the homes in the area as much as possible while also meeting other design constraints, it is not possible to completely eliminate shadow flicker. A discussion of mitigation options is provided in Exhibit 15 and the Shadow Flicker Report (Appendix T).

(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: Assessing and Mitigating Visual Impacts, DEP-00-2 (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.
- 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 both the POI and collection substations are not anticipated to have significant visual effect on nearby sensitive receptors. Therefore, visual screening of these Facility components is not anticipated to be necessary.
- Relocation: Because of the limited number of suitable locations for turbines within the Facility Site, and the variety of viewpoints from which the Facility can be seen, turbine relocation will generally not significantly alter visual impact. Moving individual turbines to less windy sites would not necessarily reduce impacts but could affect the productivity and viability of the Facility. Where visible from sensitive resources within the study area, views of the Facility are highly variable and include different turbines at different vantage points. Therefore, turbine relocation would generally not be effective in mitigating visual impacts on sensitive resources. Additionally, the Facility layout has been designed to accommodate various setbacks from roads and residences, which limits options for relocation of individual Facility components.
- Camouflage: The proposed 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. The size and movement of the turbines

prevents more extensive camouflage from being a viable mitigation alternative (i.e., the turbines cannot be made to look like anything else). Nielsen (1996) notes that efforts to camouflage or hide wind farms generally fail, while Stanton (1996) feels that such efforts are inappropriate. She believes that wind turbine siting "is about honestly portraying a form in direct relation to its function and our culture; by compromising this relationship, a negative image of attempted camouflage can occur." Other components of the Facility will be designed to minimize contrast with the existing agricultural character in the Facility Site. For instance, new road construction will be minimized by utilizing existing farm lanes wherever possible and, in most instances, electrical collection lines will be buried.

- Low Profile: A significant reduction in turbine height is not possible without significantly decreasing power generation. Less generating capacity (resulting from smaller turbines) could threaten the Facility's economic feasibility. To avoid generation losses, use of smaller turbines would require that additional turbines be constructed. Several studies have concluded that people tend to prefer fewer larger turbines to a greater number of smaller ones (Thayer & Freeman, 1987; van de Wardt & Staats, 1988). There will be no visual impact from the electrical collection system, which will be installed underground. The only aboveground line is a short section connecting the collection and POI substations.
- Downsizing: Reducing the number of turbines could reduce visual impact from certain viewpoints, but from most locations within the study area where more than one turbine is visible, the visual impact of the Facility would change only marginally unless a substantial number of turbines were removed. Moreover, the number of proposed turbines, anticipated to be up to 40 at the time the Preliminary Scoping Statement (PSS) was prepared, has already been reduced to 33. Along with affecting the financial viability of the Facility, further elimination of turbines could significantly reduce the socioeconomic benefits of the Facility and reduce the Facility's ability to assist the State in meeting its energy policy objectives and goals.
- Alternate Technologies: Alternate technologies for comparable power generation, such as gas-fired or solar-powered facilities, would have different, and perhaps more significant, visual impacts than wind power. A solar project capable of generating an equivalent 124 MW of power would require approximately 800 to 1,000 acres of open land. Within the Project Site, this would require significant clearing of existing forest vegetation. 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 Project.
- Non-specular Materials: Non-reflective paints and finishes will be used on the wind turbines to minimize reflected glare.
- Lighting: The analyses presented herein are based on the conservative assumption that all turbines will be lit with two FAA warning lights. However, turbine lighting will be kept to the minimum allowable by the FAA. Medium intensity red strobes will be used at night, rather than white strobes or steady burning red

lights. Fixtures with a narrow beam path will be utilized as a means of minimizing the visibility/intensity of FAA warning lights at ground-level vantage points. Lighting at the substations will be kept to a minimum, and turned on only as needed, either by switch or motion detector.

- Maintenance: The turbines and turbine sites will be maintained to ensure that they are clean, free of debirs, and operating efficiently. Research and anecdotal reports indicated 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 a substantial adverse visual impact at a particular viewpoint. Based on rating panel results, such impacts could be experienced by certain viewers at Deer Lake and the Village of Deposit. Projects that provide enhanced public access, recreational opportunities or environmental services at these locations could be proposed as offset mitigation for potential visual impacts to these resources and its users.

(11) Description of Visually Sensitive Resources to be Affected

Visually sensitive resources of statewide significance were identified within the larger 10-mile extended study area. 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.

In addition, resources of local significance within the 5-mile study area 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 ZZ) includes identification of locations within the visual study area where it may be possible to view the proposed wind turbines and other proposed above-ground facilities from ground-level vantage points. This analysis includes identifying potentially visible areas on viewshed maps. The methodology employed is described below.

(1) Viewshed Maps

Viewshed maps define the maximum area from which any turbine within the completed Facility could potentially be seen within the 10-mile extended study area during both daytime and nighttime hours based on a direct line of sight and ignoring the screening effects of existing vegetation and structures. Separate maps were prepared showing both the results of the viewshed analysis based on the screening effect of topography alone, and the combined screening effect of mapped forest vegetation and topography. The viewshed analyses were based on maximum blade tip height and FAA warning light height. These maps are presented on ArcGIS® World Topographic mapping (Figure 7 of the VIA). Additionally, results of the viewshed analysis are also shown on maps that depict visually sensitive sites, viewpoint locations, foreground, midground and background distances, and LSZs (Appendix A of the VIA).

With respect to line of sight profiles, 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 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 Article 10 Application, the viewshed analyses also serves to document the line of sight profiles for resources of statewide concern.

Potential wind turbine visibility, as indicated by viewshed analysis, is illustrated in Figure 7 of the VIA, and summarized below in Table 24-2. The topographic/DEM viewshed results are most accurate at identifying areas where there is no potential for views of the Facility due to topographic interference and are less accurate at predicting actual visibility due to its overly conservative nature (i.e., effectively assuming that no trees or structures exist in the landscape). Based only on the screening provided by topography alone, the blade tip DEM viewshed analysis indicates the proposed turbine arrays will be fully screened from view by intervening topography from approximately 27.6% of the 5-mile study area and from approximately 46.0% of the 10-mile extended study area (VIA Figure 7, Sheet 1; Table 24-2). Portions of the visual study area where there is no possibility of seeing the Facility include large portions of the sizable valleys that lie to the east and west of the Facility Site. This includes the valley associated with the Susquehanna River (the eastern valley wall and the river itself are primarily screened; however, potential visibility is indicated from the western valley wall), the valley associated with Coldspring Creek and NYS Route 20, the valley associated with the East Branch Cold Spring Creek and US Route 8, and Cannonsville Reservoir. Hillsides oriented away from the Facility Site are generally screened from view. These screened areas begin to appear at a distance of 1 to 2 miles from the nearest turbine and increase in size and frequency with distance from the Facility.

Turbine visibility beyond the 5-mile study area decreases rapidly. Visibility is particularly limited in the eastern and southwestern portions of the 10-mile extended study area where potential visibility is only indicated along hilltops and ridgelines. Topographic screening is less extensive in the northwestern portion of the 10-mile extended study area but is indicated along sizable stretches of the Susquehanna River, Interstate 88, and other valley areas. Visually sensitive resources that will be fully screened from view by topography alone include 30 NRHP-listed resources (all located within/contributing to the Windsor Village Historic District), 10 NRHP-eligible resources, six streams, four state forest trails, one state fishing access area, two schools (Windsor Middle School and A.F. Palmer Elementary School), and seven cemeteries. Appendix C of the VIA presents a comprehensive inventory of visually sensitive resources within 10 miles of the Facility Area.

Table 24-2. Summary of Turbine Viewshed Results for the Visual Study Areas

Number of Turbines Visible	5-Mile Study Area[1] Viewshed Results							
	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	50.9	27.6	152.6	82.6	61.6	33.3	158.3	85.7
1-8	44.1	23.9	22.5	12.2	52.2	28.3	21.1	11.4
9-16	37.0	20.0	7.0	3.8	35.5	19.2	4.2	2.3

17-24	25.2	13.6	1.8	0.9	17.6	9.5	0.9	0.5
25-33	27.6	14.9	0.9	0.5	17.9	9.7	0.3	0.1
Total Visible	133.9	72.4	32.2	17.4	123.2	66.7	26.5	14.3
10-Mile Extended Study Area[2] Viewshed Results								
0	196.5	46.0	380.9	89.2	219.2	51.4	389.8	91.3
1-8	70.9	16.6	29.8	7.0	80.4	18.8	27.2	6.4
9-16	51.6	12.1	9.6	2.2	50.0	11.7	6.3	1.5
17-24	40.8	9.6	3.7	0.9	30.9	7.2	2.1	0.5
25-33	67.0	15.7	2.8	0.7	46.3	10.9	1.4	0.3
Total Visible	230.3	54.0	45.9	10.8	207.6	48.6	37.0	8.7

[1]The visual study area includes approximately 184.8 square miles, or approximately 118,299 acres.
[2] The expanded study area is inclusive of the visual study area and covers approximately 426.8 square miles, or approximately 273,200 acres.

Areas that will be screened from nighttime views of the turbines, as indicated by the FAA topographic/DEM viewshed analysis (VIA Figure 7, Sheet 2; Table 24-2 above), include approximately 33.3% of the 5-mile study area and approximately 51.4% of the 10-mile extended study area. This analysis indicates that the FAA warning lights will generally be screened from view in the same areas where screening of daytime blade-tip height visibility was indicated, only slightly expanded due to the shorter height of the FAA warning lights, which results in a minor reduction in visibility. 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.

Accounting for screening by vegetation and structures in the second-level DSM viewshed analysis drastically reduces potential turbine visibility throughout the study area (VIA Figure 7, Sheets 3 and 4). These features, in combination with topography, will serve to block daytime views of the turbines from approximately 82.6% of the 5-mile study area and approximately 89.2% of the 10-mile extended study area (i.e., 17.4% and 10.8% of the study areas, respectively, are indicated as having potential Facility visibility). Areas of potential nighttime visibility, as indicated by FAA DSM viewshed analysis, are limited to approximately 14.3% of the 5-mile study area and approximately 8.7% of the 10-mile extended study area. This drastic reduction in visibility, in comparison with to the DEM viewshed analyses, is due to the prevalence of forestland covering steep slopes and ridgelines throughout the study area, providing little opportunity for open views of the Facility. Based on the results of the DSM viewshed analysis, Facility views will generally be most available in open agricultural areas, which are concentrated in relatively gently sloped valley bottoms. Facility visibility is indicated along roadways that follow these valleys, including County Routes 19 and 543, NYS Routes 17 and 41, Interstate 86, Shaver Hill Road, Big Hollow Road, Farnham Road, William Law Road, Pazzelli Road, Clark Road, and others. Areas of potential visibility are scattered intermittently through the Susquehanna River Valley, primarily within agricultural fields on slopes facing the Facility. Visibility is also indicated from portions of Cannonsville Reservoir and the West Branch

Delaware River. Results within the 10-mile extended study area indicate that open long-distance views of the Facility may be available from locations northwest of the Facility where gentler topography has allowed for hilltop agricultural use. Facility visibility is also indicated along portions of Interstate 88 and continued visibility along State Route 17/Interstate 86. Elsewhere, the combination of topography and forest vegetation is quite effective in limiting Facility visibility.

Visually sensitive sites that were not fully screened by topography alone but are indicated to be fully screened by a combination of topography, vegetation, and/or structures include 22 NRHP-listed resources (most of which are located within/contributing to the Windsor Village Historic District), four NRHP-eligible resources, one local park (Klumpp Park), six surface water resources, nine state forest trails, two state waterway access areas, and one cemetery. The DSM viewshed analysis also indicates reduced, but not eliminated, Facility visibility at the remainder of the inventoried visually sensitive resources as a result of screening provided by vegetation and structures (see Appendices A and C of the VIA).

An analysis comparing potential daytime Facility visibility within the various LSZs is presented in Table 24-3.

Table 24-3. Blade Tip Vegetation Viewshed Results by Landscape Similarity Zone, Visual Study Area

Number of Turbines Visible	10-Mile Extended Study Area[1] Viewshed Results by Landscape Similarity Zone (% of LSZ with Potential Facility Visibility)				
	Forest	Open Water	Transportation Corridor	Rural Residential/ Agricultural	Village
0	94.7	89.2	75.9	67.0	80.3
1-8	3.9	10.1	18.6	18.2	16.3
9-16	0.8	0.6	3.7	8.5	3.2
17-24	0.3	<0.1	1.4	3.5	0.2
25-33	0.2	<0.1	0.4	2.8	<0.1
Total Visible	5.2	10.8	24.1	33.0	19.7

[1]The viewshed analysis area (within 10 miles of proposed project components) includes approximately 426.8 square miles, or approximately 273,200 acres

- Facility visibility will be most limited within the Forest LSZ, with potential turbine views indicated from approximately 5.2% of the 328 square mile LSZ. Portions of the Forest LSZ with potential turbine views include areas where forest clearing will occur, as well as natural clearings or areas of sparse/low vegetation within forest settings. The Facility will not be visible from the vast majority of this LSZ due to the screening effects of the forest canopy, which limits or eliminates outward views.
- The Open Water LSZ occupies 11 square miles within the 10-mile extended study area and has potential views of the Facility from 10.8% of its area. Turbine visibility is indicated from several small, centrally located,

water bodies including Marsh Pond, Beaver Pond, Sky Lake, Deer Lake, Fly Pond, and the southern portion of Oquaga Lake. Visibility is also indicated along limited portions of the Susquehanna River and West Branch Delaware River. Minimal visibility is indicated from the Cannonsville Reservoir, with turbines screened from view for the vast majority of this resource. Many smaller water bodies toward the outer extent of the 10-mile extended study area also have little to no visibility indicated.

- Viewshed results indicate that approximately 19.7% of the more populated portions of the 10-mile extended study area that comprise the Village LSZ may have views of the proposed wind turbines. The majority of this visibility occurs within the higher elevation portions of the Villages of Deposit and Afton, while visibility within the Village of Windsor is extremely limited. In general, the buildings and associated landscaping vegetation that typify this LSZ will provide a great deal of screening, restricting the majority of potential views to the village/hamlet outskirts.
- The proposed turbines may be visible from approximately 24.1% of the Transportation Corridor LSZ, which consists of the Interstate Route 88 and Interstate Route 86/NYS Route 17 corridors. While visibility is indicated almost continuously along Interstate Route 86/NYS Route 17, the Facility will be screened from view where the corridor crosses the Susquehanna River, as it passes south of Tarbell Hill, and extending east from Hungry Hollow. Visibility from Interstate Route 88 occurs primarily to the west of the Susquehanna River.
- The greatest potential for Facility visibility is indicated within the Rural Residential/Agricultural LSZ, with approximately 33.0% of this 74 square mile LSZ having potential turbine views. These areas of visibility are focused within the agricultural fields that line the stream valleys running through the Facility Site, including Marsh Creek, Oquaga Creek, and Big Hollow Creek. While many of the foreground and midground views available from these close-range areas will be limited to 1-16 turbines, visibility of 25-33 turbines is indicated from agricultural areas along a portion of Pazzelli Road, and William Law Road and a few other small areas. Visibility is also fairly common within this LSZ in the northwestern portion of the 10-mile extended study area, within open agricultural fields on hilltops or Facility-facing slopes. This portion of the visual study area has a higher occurrence of small areas where (distant) views of 25 turbines or more are available.

(2) Viewshed Methodology

Topographic viewshed analyses of the proposed turbines and substation were based on 2-meter resolution DEM data downloaded from New York State's Geographical Information System (GIS) Program Office FTP server, the location and height of all proposed turbines, the tallest proposed substation components, an assumed viewer height of 1.83 meters, and Environmental Systems Research Institute (ESRI) ArcGIS® software with the Spatial Analyst extension. To evaluate "worst case" potential turbine visibility, two topographic (or DEM) viewshed analyses were conducted, one to illustrate daytime visibility (based on a maximum blade tip height of 205 meters,

or 673 feet above existing grade), and the other to illustrate potential visibility of FAA obstruction warning lights at night. The nighttime viewshed was based on an estimated FAA warning light height of 131 meters, or 430 feet, above existing grade, and all turbines equipped with lights. Viewshed analysis of the proposed collection and POI substations was based on coordinates of the proposed substations and a maximum lightning mast height of 60 feet. The viewshed analyses evaluated potential turbine visibility within a 10-mile radius study area and potential substation visibility within a 1-mile radius study area.

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 location/elevation coordinates of Facility components from observation points throughout the study area. The resulting topographic viewshed maps define the maximum area from which any portion of the major above-ground components of the completed Facility could potentially be seen within the study area during both daytime and nighttime hours, based on a direct line of sight and ignoring the screening effects of existing vegetation and structures. The turbine viewshed results also indicate the number of wind turbines that would be potentially visible from any given point within the study area. Results were therefore grouped by number of turbines potentially visible and presented on a viewshed map.

Results of the topographic viewshed analysis described above represent a true "worst case" assessment of potential Facility visibility. Topographic viewshed maps are very accurate in identifying area where there is no possibility of Facility visibility due to topographic interference. However, they are less accurate in identifying areas from which the Facility could actually be visible because they do not consider the screening provided by trees and buildings, which 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 to incorporate the screening effect of structures and vegetation by utilizing the Federal Emergency Management Agency (FEMA) light detection and ranging (lidar) data for the Susquehanna Basin (2007) and Delaware County (2007)[1]. Lidar is a remote sensing method that uses light in the form of a pulsed laser to measure ranges (variable

[1] The viewshed methodology set forth in the stipulations suggests the use of 10-meter digital elevation models (DEM) and the National Landcover Dataset (NLCD) in order to demonstrate potential project visibility considering topography and vegetation with an assumed vegetation height of 40 feet. However, when available, lidar can be substantially more accurate than the previously discussed methodology. Generally, it is very time consuming and labor intensive to determine if the appropriate lidar data set is available for an entire study area, so at the time the stipulations were written, it was unknown whether or not the full dataset was available. Regardless, lidar can provide a more accurate result since it uses actual vegetation height and buildings in the analysis.

distances) to the Earth to generate precise, three-dimensional information about the shape of the Earth and its surface characteristics (NOAA, 2018). A digital surface model (DSM) of the study area was created from these lidar data, which includes the elevations of buildings, trees, and other objects large enough to be resolved by lidar technology. However, these lidar datasets only cover approximately 90% of both the 5-mile and the 10-mile study areas. In areas lacking lidar data, the 2011 USGS NLCD was used to identify the mapped location of forest land (including the Deciduous Forest, Evergreen Forest and Mixed Forest NLCD classifications) within the visual study area. Potential screening provided by structures and non-forest vegetation (i.e., yard trees, hedgerows, etc.) was not accounted for in these locations because these features are not identifiable in the NLCD or other available data. Based on standard visual assessment practice, the NLCD-mapped locations of forest land were assigned an assumed height of 40 feet and added to the DEM. A new, continuous 2-meter resolution DSM for the 10-mile extended study area was then created, utilizing the more detailed FEMA lidar data when available and the NLCD forest data (added to the DEM) in the remainder of the study area.

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 would be cleared of forest vegetation, as well as areas within a 100-foot wide corridor along access roads and a 70-foot wide corridor along collection lines. This 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 6 feet in height will generally be screened from views of the Facility.

As with the topographic viewshed analysis previously described, this second-level DSM vegetation viewshed analyses was conducted for the proposed wind turbines twice: once to illustrate daytime visibility (based on the maximum height of 205 meters above existing grade) and the other to illustrate potential visibility of FAA warning lights (based on an approximate FAA warning light height of 131 meters above existing grade and the assumption that all turbines would be equipped with lights). A DSM viewshed analysis was also conducted to further evaluate potential visibility of the proposed substation.

Because it accounts for the screening provided by structures and trees, this second-level analysis is a more accurate representation of potential Facility visibility. It is worth noting, however, that because the viewshed

analyses do not consider certain characteristics of the turbines and substation that may influence visibility (color, narrow profile, distance from viewer, etc.), being located within the DSM viewshed does not necessarily equate to actual Facility visibility.

Per the requirements set forth in 16 NYCRR § 1001.24(a), the potential cumulative visual effect of the Facility as well as other wind energy projects proposed in the surrounding region must be considered. Cumulative impacts are two or more individual environmental effects which, when taken together, are significant or that compound or increase other environmental effects. There are no operating facilities nearby the proposed Bluestone Wind Facility in New York or Pennsylvania. Consequently, there will be no cumulative visual impacts from the Facility.

(3) Sensitive Viewing Areas

In accordance with standard visual impact assessment practice in New York State, visually sensitive resources were identified in accordance with NYSDEC Visual Policy (NYSDEC, 2000), which defines specific types of properties as visually sensitive resources of statewide significance. 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). These 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 visually sensitive resources within the visual study area, EDR consulted a variety of data sources including digital geospatial data (shapefiles) obtained primarily through the NYS GIS Clearinghouse or the ESRI ArcGIS® software databases; numerous national, state, county, and local agency websites as well as websites specific to identified resources; the DeLorme Atlas and Gazetteer for New York State; USGS 7.5-minute topographical maps; and web mapping services such as Google Maps. Aesthetic resources of national and statewide significance were identified within a 10-mile radius of the Facility Site. NRHPeligible sites, as well as locally significant aesthetic resources and areas of intensive land use were identified within a 5-mile radius of the Facility Site. The complete inventory of visually sensitive resources is presented in Appendix C of the VIA. Their locations are shown in Figure 5 of the VIA, and also on the composite overlay map included in Appendix A of the VIA.

In addition to the sensitive resource research conducted above, an exhaustive examination of local and regional planning documents was also undertaken. This included state and regional plans out to the 10-mile extended study area and local plans out to the 5-mile study area. The resources identified in the plans were already included in the sensitive resource research or did not fall within the viewshed. These plans included a common theme of promoting policy that encourages renewable energy construction. This policy is consistent with the policy of promoting local jobs, and of highlighting the natural resources that are available in the visual study area. See Appendix H of the VIA for a summary of the municipal plan documents reviewed.

In accordance with the requirements set forth in 16 NYCRR § 1001.24(b)(4) as well as the Article 10 PSS for the Facility dated August 2017, the Applicant conducted a systematic program of public outreach to assist in the identification of visually sensitive resources. Copies of the correspondence sent by the Applicant as part of this process, as well as responses received from stakeholders, are included as Appendix G of the VIA. This outreach included the following:

- The Applicant distributed a request on January 19, 2018 to 49 municipal planning representatives, regional organizations, and State of New York interested parties. Feedback was requested regarding the identification of important aesthetic resources and representative viewpoints in the Facility vicinity to inform field review efforts and the eventual selection of candidate viewpoints for the development of visual simulations. The materials provided as part of this submission to interested stakeholders included: a summary of the purpose and necessity of consultation per the requirements of Article 10; a definition, explanation, and map of the visual study area; a preliminary inventory and map of visually sensitive resources identified in accordance with NYSDEC Visual Policy; a preliminary viewshed (visibility) analysis; a discussion of anticipated subsequent steps, including additional consultation regarding the eventual selection of viewpoints for development of visual simulations; the visual stakeholder distribution list; and a request for feedback regarding additional visually sensitive resources to be included in the analysis.
- In response to this request, EDR received feedback from five of the visual stakeholders including the NYSDEC, New York State Office of Parks, Recreation and Historic Preservation (NYSOPRHP), and representatives of the Towns of Colesville, Tompkins, and Windsor. An additional 30 resources were garnered from the outreach process and were added to the visually sensitive resource table (see Appendix C of the VIA) and cross-referenced with the viewshed mapping to confirm possible field review. For a full list of the resources recommended by the individual responding parties, refer to Appendix G of the VIA.

- In addition, EDR (2018) conducted a historic resources survey (in consultation with the NYSOPRHP) of the study area to identify potential historic sites within the 5-mile study area. NRHP-listed sites were further mapped within the 10-mile extended study area as well. The results of this survey are presented in a final report that is attached to Exhibit 20 under Appendix EE. There are 52 NRHP-listed sites and two NRHP-listed districts within the 10-mile extended study area and 20 NRHP-eligible sites present within the 5-mile study area.

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 C of the VIA and further described below.

There are no National Parks, National Forests, National Wildlife Refuges, National Natural Landmarks, State Nature Preserves, designated scenic sites, areas, lakes, reservoirs or highways, Scenic Areas of Statewide Significance, exceptionally beautiful or open space Bond Act Properties, and no federally or state designated Wild, Scenic or Recreational Rivers within the 10-mile extended study area.

The Facility's 10-mile extended study area includes 225 sites that the NYSDEC Visual Policy (NYSDEC, 2000) considers, or were identified through the visual outreach process, aesthetic resources of statewide and local significance (see Appendix C of the VIA). These include 52 sites and two districts listed on the NRHP; one state park; one state heritage area; one state forest preserve; three state game refuges; 18 NYSDEC-designated trails; 17 NYSDEC forests; five NYDEC fishing access sites; two NYSDEC waterway access sites; one snowmobile trail; eight areas of intensive land use; seven transportation corridors; two local parks; 41 rivers and lakes; two golf courses; four schools; one library; 31 cemeteries; three federally-designated trails; and six other local resources. Additionally, the 5-mile study area includes 20 sites that have been determined by NYSOPRHP to be eligible for NRHP-listing.

In addition to the scenic resources of statewide significance listed above, the visual study area 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. Locally significant resources are listed in Appendix C of the VIA.

(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, APA in its selection of important or representative viewpoints*"[2]. Building on the previous consultation with municipal representatives and stakeholders to identify visually sensitive sites (as described above in Section (b)(3) of this Exhibit and in Section 3.6 of the VIA), 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 G of the VIA. This outreach effort included:

- On April 27, 2018, in accordance with 16 NYCRR § 1001.24(b)(4), EDR distributed a letter entitled "Bluestone Wind LLC (DPC Case 16-F-0559) - Recommended Viewpoints – Official Request for Information," to appropriate municipal planning representatives and State of New York interested parties (see Appendix G of the VIA). This memo included 1) a summary of research and consultation undertaken as part of the VIA to date, 2) a description of the field review/photography conducted for the Facility, 3) a rationale for viewpoint selection, and 4) recommendations that 11 specified viewpoints be selected for the preparation of visual simulations. The rationale provided for selection of the recommended viewpoints included the following factors:
    - They provide representative views of the Facility from the various LSZs and Distance Zones within the study area.
    - They include visually sensitive resources/sites within the study area, including sites recommended by the DPS and other stakeholders during review of the Facility's PSS and the first round of visual outreach.
    - A significant portion of the Facility would likely be visible based on viewshed analysis and field review.
- In response to the April 27, 2018 visual outreach, EDR received feedback and viewpoint recommendations from the towns of Deposit and Windsor as well as two state agencies, DPS and NYSOPRHP. These recommendations were added to the table of sensitive resources (Appendix C of the VIA) and visited during the May 24, 2018 field visit. For a complete list of the resources recommended through the visual outreach process, please see Appendix G of the VIA.

Based on the outcome of local stakeholder, regional interest group, and state and regional agency consultation, a total of 19 viewpoints were ultimately selected for the development of visual simulations, with eight additional

locations identified for 'wire frame' renderings (as documented in June 15, 2018 email correspondence with the DPS). These viewpoints were selected based upon the following criteria:

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

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

Table 24-4. Viewpoints Selected for Simulation

Viewpoint Number	Location and/or Visually Sensitive Resource	LSZ Represented	Viewer Group Represented	Viewing Distance[1]	Town
12	2nd Street, Village of Deposit	Village	Local Residents, Tourists/Recreational Users	1.78	Deposit
15	Elm Street, at Deposit Middle/High School Track	Village	Local Residents	1.83	Deposit
17	State Route 17, Village of Deposit	Transportation Corridor	Through-Travelers/Commuters	2.58	Deposit
22	State Route 8, Village of Deposit	Rural Residential/Agricultural	Through-Travelers/Commuters	2.28	Deposit
39	Orange Ski Trail, Oquaga State Park	Rural Residential/Agricultural	Tourists/Recreational Users	6.63	Sanford
48	CR 241 (North Sanford Road) at Oquaga Creek NYSDEC Fishing Access	Rural Residential/Agricultural	Local Residents, Tourists/Recreational Users	0.79	Sanford
55	William Law Road	Rural Residential/Agricultural	Local Residents	0.86	Sanford
58	Pazzelli Road	Rural Residential/Agricultural	Local Residents	0.9	Sanford
59	Center Village Bridge over the Susquehanna River	Rural Residential/Agricultural, Open Water	Local Residents, Tourists/Recreation Users	4.72	Colesville

61	State Route 79	Rural Residential/Agricultural	Local Residents, Though-Travelers/Commuters	2.96	Colesville
64	Interstate 86/State Route 17	Transportation Corridor	Through-Travelers/Commuters	1.95	Windsor
67	State Route 10/NYS Bicycle Route 17, at Cannonsville Reservoir	Open Water	Tourists/Recreational Users	4.1	Deposit
69	Pine Street Extension Bridge over the West Branch Delaware River	Village, Open Water	Local Residents, Tourists/Recreational Users	2.06	Deposit
83	Page Pond Road	Forest	Tourists/Recreational Users	1.77	Sanford
85	Loomis Hill Road	Forest	Local Residents	0.4	Sanford
102	Marsh Pond State Forest, water access, Marsh Pond Road at Bryce Road	Open Water	Local Residents, Tourists/Recreational Users	1.48	Sanford
104	Bryce Road	Forest	Local Residents, Tourists/Recreational Users	0.5	Sanford
107	Mountain View Drive, Deer Lake	Forest, Open Water	Local Residents	0.98	Sanford
113	Piper Hill Road, west of White Birch Lake Road	Rural Residential/Agricultural	Local Residents	4.2	Windsor

[1]Distance from viewpoint to nearest visible turbine (in miles)

In addition to the viewpoints selected for the development of turbine simulations, two viewpoints were selected to illustrate the appearance of 1) the proposed POI substation with battery storage and collection substation, located west of Big Hollow Road, in the Town of Sanford and 2) the O&M building north of William Law Road also in the Town of Sanford. These locations offered the most unobstructed views of these proposed Facility components, including required site grading, vegetation removal/clearing and the various proposed structure types (see VIA Figure 10).

(5) Photographic Simulations

To show anticipated visual change associated with the proposed Facility, high-resolution computer-enhanced image processing was used to create realistic photographic simulations of the proposed turbines, met towers and associated clearing from each of the 19 selected viewpoints. The photographic simulations were developed using the method described in Section (a)(4) 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. However, one simulation was done to compare leaf-on and leaf-off conditions. As previously mentioned, representative viewpoints were selected based on the feedback provided by municipal planning representatives and DPS, NYSDEC, and NYSOPRHP staff, while also considering the other factors stated above. The photographic simulations are presented in Appendix D of the VIA (Appendix ZZ).

(6) Additional Simulations Illustrating Mitigation

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

(7) Simulation Rating and Assessment of Visual Impact

As discussed in Section (a)(8) above, three professionals with experience in the visual/aesthetics field (one in-house and two independent) evaluated the visual impact of the proposed Facility. Utilizing 11 x 17-inch digital color prints of the 20 visual simulations (including two from Viewpoint 67) 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 F 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 24-5.

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

Viewpoint Number	Distance to Nearest Visible Turbine[1]	Distance Zone	Landscape Similarity Zone	Viewer Groups			Contrast Rating Scores[2]				
				Local Residents	Through Travelers/ Commuters	Tourists/ Recreation	#1	#2	#3	Average	Contrast Rating Result
22	2.4	Mid-Ground	Rural Residential / Agriculture		●		2.3	0.9	2.0	1.8	Minimal / Moderate
39	4.8	Background	Rural Residential / Agriculture			●	0.5	0.4	1.6	0.8	Insignificant / Minimal
48	0.8	Mid-Ground	Rural Residential / Agriculture	●	●		2.7	2.8	2.5	2.6	Moderate / Appreciable
55	0.9	Mid-Ground	Rural Residential / Agriculture	●			2.7	1.7	2.2	2.2	Moderate
58	0.9	Mid-ground	Rural Residential / Agriculture	●			3.2	2.6	3	2.9	Moderate / Appreciable

Viewpoint Number	Distance to Nearest Visible Turbine[1]	Distance Zone	Landscape Similarity Zone	Viewer Groups			Contrast Rating Scores[2]				
				Local Residents	Through Travelers/ Commuters	Tourists/ Recreation	#1	#2	#3	Average	Contrast Rating Result
59	4.8	Background	Rural Residential / Agriculture			●	2.3	1.4	1.6	1.8	Minimal / Moderate
61	3.0	Mid-Ground	Rural Residential / Agriculture	●	●		2.3	1.2	2.2	1.9	Minimal / Moderate
113	4.2	Background	Rural Residential / Agriculture	●			2.8	0.8	2.2	1.9	Minimal / Moderate
Total average rating for the Rural Residential / Agriculture LSZ										2.0	Moderate
83	1.7	Mid-Ground	Forest & Open Water			●	2.1	3.5	3.7	3.1	Appreciable
85	0.4	Foreground	Forest	●			3.2	3.1	2.4	2.9	Moderate / Appreciable
102	1.5	Mid-Ground	Forest & Open Water	●		●	3.3	2.8	3.6	3.2	Appreciable
104	0.5	Foreground	Forest	●			3.1	2.8	2.8	2.9	Moderate / Appreciable
107	1.0	Mid-Ground	Forest & Open Water	●			2.9	2.3	2.8	2.7	Moderate / Appreciable
Total average rating for the Forest LSZ										3.0	Appreciable
67 (Leaf On)	4.1	Background	Open Water			●	3.3	2.7	3.1	3.0	Appreciable
67 (Leaf Off)	4.1	Background	Open Water			●	2.8	1.3	2.4	2.2	Moderate
69	2.1	Mid-Ground	Open Water & Village	●		●	1.0	2.1	1.4	1.5	Minimal / Moderate
83	1.7	Mid-Ground	Open Water & Forest			●	2.1	3.5	3.7	3.1	Appreciable
102	1.5	Mid-Ground	Open Water & Forest	●		●	3.3	2.8	3.6	3.2	Moderate / Appreciable
107	1.0	Mid-Ground	Open Water & Forest	●			2.9	2.3	2.8	2.7	Moderate / Appreciable
Total average rating for the Open Water LSZ										2.6	Moderate / Appreciable
12	1.8	Mid-Ground	Village	●		●	0.6	0.9	1.2	0.9	Insignificant / Minimal
15	1.8	Mid-Ground	Village	●			0.8	1.9	1.8	1.5	Minimal / Moderate
69	2.1	Mid-Ground	Village & Open Water	●		●	1.0	2.1	1.4	1.5	Minimal / Moderate
Total average rating for the Village LSZ										1.3	Minimal
17	2.6	Mid-Ground	Transportation Corridor		●		2.4	1.3	2.0	1.9	Minimal / Moderate

Viewpoint Number	Distance to Nearest Visible Turbine[1]	Distance Zone	Landscape Similarity Zone	Viewer Groups			Contrast Rating Scores[2]				
				Local Residents	Through Travelers/ Commuters	Tourists/ Recreation	#1	#2	#3	Average	Contrast Rating Result
64	1.4	Mid-Ground	Transportation Corridor		•		2.7	2.8	2.8	2.8	Moderate / Appreciable
Total average rating for the Transportation Corridor LSZ										2.4	Moderate

[1]Distance in miles.
[2]Contrast Rating Scale: 0.0 - 0.4 (Insignificant), 0.5 – 0.9 (Insignificant/Minimal), 1 – 1.4 (Minimal), 1.5 – 1.9 (Minimal/Moderate), 2 - 2.4 (Moderate), 2.5 – 2.9 (Moderate/Appreciable), 3 – 3.4 (Appreciable) 3.5 – 3.9 Appreciable/Strong), 4 (Strong).

As Table 24-5 indicates, the average overall composite contrast ratings for the 20 visual simulations ranged from 0.8 (Insignificant/Minimal) to 3.2 (Appreciable). The results of this evaluation are summarized as follows.

Rural Residential/Agriculture (Viewpoints 22, 39, 48, 55, 58, 59, 61, and 113)

Simulations of the Facility from viewpoints located within the Rural Residential/Agriculture LSZ received average contrast rating scores that ranged from 0.8 for Viewpoint 39 to 2.9 for Viewpoint 58. The low contrast rating for Viewpoint 39 is largely attributable to the background distance at which the proposed turbines are viewed. Comments from the rating panel indicated that the turbines would be barely visible and would not have a substantial impact on the existing character or scenic quality of this viewpoint. Viewpoint 58 received contrast ratings of 2.9 due largely to the number of turbines visible and their proximity to the viewer. Under these conditions, the turbines become the dominant features of the landscape and focal points in the view. The overall conclusion from the rating panel is that the Facility will have a generally moderate effect on viewpoints in the Rural Residential/Agriculture LSZ. Their general impact is limited due to the lack of sensitive resources found within this LSZ, the screening provided by topography, and the compatibility of the turbines with the working agricultural land use that characterizes most existing views.

Forest LSZ (Viewpoints 83, 85, 102, 104, and 107)

Viewpoints located within the Forest LSZ received average contrast rating scores that ranged from 2.7 for Viewpoint 107 to 3.2 for Viewpoint 102. Rating panel results indicated a moderate to appreciable contrast rating due to scenic quality of existing views and the presence of sensitive resources. Comments from the rating panel indicated that there may be a significant effect on viewer enjoyment due to the contrast of scale and form of the turbines within the Forest LSZ. Depending on viewer perspective of wind energy, some viewers may find the presence of the turbines interesting due to the visibility of the structures' details, while others may find the scale and height of the turbine substantially adverse compared to existing conditions. Viewer sensitivity at the state forests where these viewpoints are located may contribute to perceived visual impact at viewpoints where the turbines are closer or less well screened.

Open Water LSZ (Viewpoint 67 Leaf-On, 67 Leaf-Off, 69, 83, 102, and 107)

Viewpoints located within the Open Water LSZ received average contrast rating scores that ranged from 1.5 for Viewpoint 69 to 3.2 for Viewpoint 102. Rating panel results indicate that the proposed Facility will add highly visible man-made, utilitarian features to an otherwise natural landscape, which presents strong contrast with the current land use and viewer activity. The focal point in the view will re-align upward from the water surface and shoreline to the skyline and the proposed turbines. The overall conclusion from the rating panel is that the Facility will present moderate to appreciable contrast on multiple features of the landscape within the Waterfront/Open Water LSZ. Viewer sensitivity at ponds, lakes, and fishing access points may contribute to perceived visual impact. However, for many of the viewpoints within this LSZ, the existing view represents "worst case" Facility visibility in regard to lighting conditions, clear weather, and time of year.

Village LSZ (12, 15, and 69)

Simulations from viewpoints located within the City/Village/Hamlet LSZ received average contrast rating scores that ranged from 0.9 at Viewpoint 12 to 1.5 at Viewpoints 15 and 69. At Viewpoint 12, rating panel results indicate that the proposed Facility has insignificant to minimal contrast with other landscape features in this view. The treetops at the horizon distract from the turbines and multiple focal points attract the viewer's gaze. At Viewpoints 15 and 69, rating panel results suggest that the visual contrast would be minimal to moderate due to the form and scale of the turbines and their contrast along the horizon. However, visual impact was mitigated by the already compromised scenic quality of the existing views. Within the Village LSZ, outward views from most locations within this zone are well screened by structures and street/yard trees that limit potential Facility visibility.

Transportation Corridor LSZ (Viewpoints 17 and 64)

Simulated views of the Facility from viewpoints located within the Transportation Corridor LSZ received average contrast rating scores that ranged in value from 1.9 at Viewpoint 17 to 2.8 at Viewpoint 64. The low contrast rating received by Viewpoint 17 can be attributed to the strong presence of the highway in the existing view and the fleeting nature of the view. The moderate to appreciable contrast noted for Viewpoint 64 is due primarily to the proximity of the unscreened turbines and their placement along an axis with the road. Impact of the Facility in this LSZ is mitigated by the limited sensitivity and relatively short duration of views typical of viewers traveling the Interstate highways. Although prolonged views are available at the designated rest stops, in these venues the turbines are likely to add interest to the view and actually enhance the experience of travelers passing through the area.

As indicated by the contrast ratings/summary in Table 24-3 (see also Appendix F of the VIA), the rating scores provided by the three landscape architects were generally consistent, with few outliers or conflicting scores.

Although appreciable to strong contrast was noted for some viewpoints, the overall contrast presented by the Facility is considered moderate. Rating panel results indicate that the number of turbines visible and their scale and form contrast with the landform, vegetation, and sky were the primary sources of visual contrast with the existing landscape. The greatest perceived visual impact typically occurs when numerous turbines are visible, where the turbines are in close proximity to the viewer, or where the turbines appear out of place in their setting (e.g., in a residential context). These conditions tend to heighten the Facility's contrast with existing elements of the landscape in terms of line, form, and especially scale. Factors mitigating visual impact include, 1) the rolling topography that limits the number of turbines visible from valley locations, 2) the relatively few viewers present on the elevated plateaus and ridgetops where views of numerous turbines and near foreground views will be available, 3) the substantial screening provided by existing foreground landscape features in forested areas and areas of concentrated human settlement, and 4) the working agricultural character of much of the landscape in which the Facility would be viewed.

Views from some water/waterfront settings (e.g., the shore of Marsh Pond; Cannonsville Reservoir) have the potential for more substantial visual impact due to the strong land use contrast presented by the turbines and the relatively high sensitivity of viewers in this setting. However, even in this context, visual impact is mitigated to some extent by the presence of existing utility structures, screening provided by vegetation, and the fact that not all viewers will find the turbines to be aesthetic liabilities.

Although at times offering appreciable contrast with existing elements of the landscape, the proposed Facility will not necessarily be perceived by viewers as having an adverse visual impact. Wind turbines are unlike most other energy/infrastructure facilities, such as transmission lines or conventional power plants, which are almost universally viewed as aesthetic liabilities. Wind turbines have a clean sculptural form that is considered attractive by some viewers (Pasqualetti et al., 2002). 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 several surveys conducted by Jefferson County Community College (JCCC) in Lewis County, New York (location of the 195-turbine Maple Ridge Farm Project in operation since 2006), which revealed strong community support for wind power (JCCC, 2008, 2010, 2011, 2012). A significant majority (approximately 90%) of Lewis County residents who participated in these surveys expressed support for the development of additional wind energy projects. 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 (Bishop & Proctor, 1994; Gipe, 2003). A study of public perception of wind power in Scotland and Ireland (Warren et. al., 2005) provided the following conclusions:

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

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

(8) Visible Effects Created by the Facility

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

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