

f) Aquatic Species and Invasive Species:

An analysis of the impact of the construction (including blasting, if necessary) and operation of the facility on biological aquatic resources, including species listed as endangered, threatened, or species of special concern in 6 NYCRR Part 182, and including the potential for introducing and/or spreading invasive species. This will include a discussion of anticipated impacts, if any, to aquatic species during all life cycle stages. The presence of invasive species within the Facility site will be documented during wetland and stream delineations and other on-site investigations.

However, no species-specific surveys for invasive or aquatic species are planned. An identification and evaluation of reasonable avoidance measures and, where impacts are unavoidable, mitigation measures regarding impacts on such biological aquatic resources, including species and invasive species impacts (if any) to assure compliance with applicable water quality standards (6 NYCRR Part 703). This identification and evaluation will address trout stream impacts, particularly for construction phase impacts.

g) Cooling Water will not be required by the Facility and, as such, a cooling water system description will not be included in the Application.

Stipulation 24 – 1001.24 Exhibit 24: Visual Impacts

Exhibit 24 shall comply with the requirements of 1001.24 by containing:

- a) A Visual Impact Assessment (VIA) conducted to determine the extent and assess the significance of Facility visibility. The VIA procedures used for this study will be consistent with general approach or limited provisions included in methodologies developed by various state and federal agencies, including the U.S. Department of the Interior, Bureau of Land Management (1980), the New York State Department of Environmental Conservation Program Policy DEP-00-2 (2000), and the U.S. Army Corps of Engineers Visual Resources Assessment Procedure. The components of the VIA shall include identification of visually sensitive resources, landscape similarity zone and user group definition, viewshed analysis, confirmatory visual assessment fieldwork, photographic simulations, visual and community character impact characterizations, cumulative impact considerations and any proposed visual impact mitigation.

The VIA shall address:

1. The character and visual quality of the existing landscape. This will be addressed by defining the character-influencing elements (topography, landform, cover type, etc.) which make up the landscape within a 10-mile radius from Facility components (the visual Study Area) and through the identification of visually sensitive resources within the visual Study Area. The Article 10 Regulations require a minimum 5-mile study area (16 NYCRR § 1000.2(ar)). NYSDEC visual guidance recommends a 5-mile study area as well, and suggests expansion for larger projects where appropriate. In light of these standards, and

in response to stakeholder comments, Lighthouse Wind has agreed to use 10 miles for its VIA. This particular region of New York consists of relatively gentle slopes and elevations range from 240 feet to 660 feet with slopes averaging approximately 1% throughout. Initial viewshed estimates suggest that visibility will diminish significantly beyond 10 miles due to interceding vegetation or topographic features. The Applicant will consult multiple publicly available resources in order to generate a comprehensive geodatabase of visually sensitive resources, following the DEC Visual Policy DEP-00-2 as a guide and as provided in 16 NYCRR §1001.24 - Exhibit 24 to determine criteria for resources. These will include significant viewpoints and designated scenic resources, areas or features including, but not limited to, the following resources, as shown in the preliminary lists included as Attachments 24(A) and 24(B) to this stipulation:

- i. The Great Lakes Seaway Trail;
- ii. Heartland Swamp State Wetlands;
- iii. State parks;
- iv. Historic resources;
- v. Sites listed on national or state registers of historic places (including sites eligible for listing);
- vi. Public parks or recreation areas;
- vii. Local, State or federally designated touring routes, scenic byways, trails, or trails proposed for designation;
- viii. Locally designated historic or scenic districts and scenic overlooks; and
- ix. High-use public areas, including local parks, recreation areas, and other community resources, and views from Lake Ontario.

Lighthouse Wind has prepared a preliminary list of visual resources, provided in Attachment 24(A) to this Stipulation. Once the Phase 1B Historic Architectural Survey is completed, Applicant will consult with DPS Staff and OPRHP-SHPO regarding study results to determine whether additional resources were identified by the survey which should be added as visually sensitive resources, in the event those resources are not already included in Attachment 24(A).

Landscape Similarity Zones will be defined based on the similarity of features such as landform, vegetation, water, and land use patterns. A preliminary Landscape Similarity Zone map is included as Attachment 24(C). The following Landscape Similarity Zones will be described in the VIA (United State Army Corps of Engineers Visual Resources Assessment Procedure, 1988):

- i. Agricultural;
- ii. Forest;
- iii. Village (including hamlets);
- iv. Open Water/Waterfront;
- v. Inland Water and Wetlands;
- vi. Developed Open Space (includes Grassland and Scrub Shrub);
- vii. Barren Land; and
- viii. Non-agricultural residential.

The Application will distinguish different viewer groups based on the following general classifications:

- i. Local Residents
 - ii. Commuters and through travelers
 - iii. Recreational Users/Tourists
 - iv. Business Employees
2. An analysis of predicted or expected visibility and identification of locations within the visual study area where Facility components are expected to be visible. Visible areas will be identified on viewshed maps and verified in the field. Line-of-site (LOS) cross sections will be produced based on 10-Meter USGS Digital Elevation Model (DEM) data and the most recent publicly available aerial photographs. The LOS will demonstrate visibility characteristics along a single line originating from a visual resource, LSZ, or specific user group and will show the relationship between viewer location, screening factors (trees and structures) and components of the proposed Facility. Photos from select identified visual resources within the visual study area will be taken to document locations from which the proposed Facility would likely be visible, partially screened, or fully screened. Photos were taken by a professional photographer experienced in preparing photographic simulations with a full frame digital SLR camera with a minimum resolution of 20 megapixels and a 50mm normal perspective lens. A full frame camera has a 35mm sensor and therefore there is no adjustment factor. Viewpoint locations will be documented, using hand-held GPS units. Data concerning weather and visibility, viewpoint location description, land cover and viewer position will be recorded on field data sheets together with corresponding photo and GPS reference numbers. The time and location of each photo will be documented on all electronic equipment (camera, GPS unit, etc.) and noted on field maps and data sheets. Viewpoints photographed during field review will generally represent the most open, unobstructed available views toward the Facility from representative locations. The preliminary inventory and map of viewpoint locations, photographs, and field data sheets are provided as Attachment 24(D). Landscape features that allow identification of the viewpoint and/or contribute to the composition and aesthetic quality of the photos will be included whenever possible.
3. The viewshed analysis described above will identify locations within the visual study area where it may be possible to view above ground interconnection facilities and access roads from ground-level vantage points. This analysis includes identifying potentially visible areas on viewshed maps and verifying LOS conditions in the field. Permanent Facility components will be included in any photographic simulation in which they would be visible. In addition to ground-level vantage points, vantage points will be included from offshore on Lake Ontario and from the upper level of Thirty Mile Point Lighthouse (subject to ability to access).
4. Photographic simulations will be representative of the size, design, color, texture and appearance for Facility components under consideration. Visual simulations will represent leaf-on conditions. The Applicant anticipates that visibility of the turbines will not be

significantly influenced by the absence of seasonal foliage with the exception of potentially higher color contrast in the summer months (white turbines against various shades of green). Additionally, it is anticipated that open unobstructed views will be chosen for use in the simulations, thus minimizing the need for leaf-off simulations. If it is determined that a resource may be seasonally impacted once the simulations are complete, the seasonal variation may be considered at that time. Further, to the extent that vegetative screening is proposed as a mitigation measure or cited as a basis for conclusions about visual impact, the Application will discuss the extent to which seasonal variability impacts these conclusions or measures. Photographic simulations will be developed by constructing a three-dimensional computer model of the proposed turbine and turbine layout. Along with the turbines, proposed clearing limits and the location and appearance of proposed meteorological towers or other visible components of the Facility will also be incorporated into the photographic simulations. While initial review suggests the study area can be comprehensively represented and addressed with 30 simulations, additional views may be necessary as a result of the consultation process.

5. Viewshed analysis based on the anticipated FAA lighting plan will show where the Facility lights will potentially be visible at night. A subset of viewpoints selected for photographic simulations will be selected for the development of nighttime simulations. These viewpoints will show lighted turbines and other lights in the landscape. In addition, lighting specifications for FAA lights on turbines, and typical lights to be used at the substation and O&M facility, will be included in the Article 10 Application. The usage of, and need for, such lights in the context of safety, lumens and direction will also be addressed.
6. Photographic simulations developed by using Autodesk 3DS MAX ® (or similar) to create a simulated perspective (camera view) to match the location, bearing, and focal length of each existing conditions photograph. Sunlight and atmospheric conditions will be programmed into the model in order to simulate the exact lighting conditions present at the time the photograph was taken. The final rendered view of the wind turbines and associated components will be accurate in scale, texture and color and will accurately portray the proposed Facility.
7. The VIA will include a discussion of nature and degree of visual change associated with the clearing of trees, construction of access roads, erection of turbines and above ground interconnections, and general construction activity. The VIA will provide representations of typical construction activities and components including any proposed concrete batch plant, contractor yards, laydown and storage areas, and other construction-support locations.
8. An evaluation of the degree and nature of the visual change resulting from Facility operation will be performed by a panel of registered landscape architects and planners (Two outside Landscape Architects and one Certified Planner, employed by visual consultant) using a standardized rating form (see Attachment 24(E)). The methodology utilized in this evaluation will be a version of the U.S. Department of the Interior, Bureau of Land Management (BLM) contrast rating methodology (USDOI BLM, 1980). The BLM framework being used has been slightly adapted to account for Facility specific issues and

to introduce the scoring system found in the US Army Corps of Engineers Visual Resources Assessment Procedure. The US Army Corps of Engineers Visual Resources Assessment Procedure and BLM rating methodology have been included as Attachment 24(F).

9. A Facility-specific shadow flicker analysis using WindPRO, WindFarmer, AWS Open Wind, or similar software. Input variables and assumptions used for shadow flicker modeling calculations for the proposed Facility will include:
 - i. Latitude and longitude coordinates and base elevation of proposed wind turbine sites.
 - ii. The rotor diameter and hub height of the largest (tallest) and smallest (shortest) turbine models under consideration. This will document the range of potential shadow flicker effects.
 - iii. Latitude and longitude coordinates for sensitive receptors (both participating and non-participating), schools, office buildings, storefronts, public sports fields, commercial buildings, public buildings, and public recreation areas where users congregate (e.g., campgrounds, boat launches, picnic areas) located within a radius of 10 x rotor diameter of all proposed turbine locations (the shadow flicker study will be limited to the area a radius of 10 x the rotor diameter of all proposed turbine locations).
 - iv. USGS 1:24,000 topographic mapping and USGS digital elevation model (DEM) data (10-meter resolution).
 - v. Annual wind rose data collected from meteorological towers within the study area, which are long-term correlated to Modern-Era Retrospective Analysis for Research and Applications (MERRA) re-analysis data and local airport stations.
 - vi. The average monthly percent of available sunshine will be reported for the nearest National Oceanic and Atmospheric Administration weather stations in Buffalo and Rochester, NY. The most conservative data will be used in the shadow flicker analysis.
 - vii. The Applicant will work with the Towns to identify, within the 10 rotor diameter radius study area, all primary structures and any officially-announced, planned land use developments, such as public recreation areas, residential sites or community buildings, under review or already approved for site plan development or building permit issuance at the time of filing the Article 10 Application. All data obtained will be used in the shadow flicker assessment. In addition, shadow flicker contours and rasters that are generated by the shadow flicker analysis software will be overlain on mapping of known public recreational areas (e.g., trails, state forest land).

- viii. The analysis will identify potential mitigation measures needed (if any) to offset any identified impacts. The report will specify the mitigation options, and for illustrative purposes, discuss what additional measures could feasibly be implemented once the Facility is constructed.

The resulting report will contain summary of impacts at each sensitive receptor¹ showing all predicted hours of shadow flicker per year and residences anticipated to receive greater than 30 minutes of shadow flicker per day. The mapping will depict potentially affected receptors with isolines representing cumulative shadow flicker hours per year. The proposed threshold for shadow flicker is based on an “actual exposure” calculation that takes into account wind rose data and historical sunshine data. However, this calculation is expected to be conservative because it does not take into account vegetative or structural screening and assumes that turbines are in continuous operation. The Application will also include assessments of the maximum number of days per year with shadow flicker and the maximum duration (in minutes) of shadow flicker modeled on any single day. Mapping at 1:24,000 scale or less will be included which depicts the full array of all turbine locations, areas of modelled shadow flicker exposure, categories of annual hours of exposure (e.g., 0 to 10 hours; 10 to 20 hours; 20 to 30 hours; 30 to 40 hours, etc.). Detailed mapping will be provided to show shadow flicker at all locations within the 10 x rotor diameter study area and areas where receptors may be exposed to shadow flicker from two or more wind turbines. Full size drawings showing flicker isolines, participant and non-participant receptors, other sensitive receptors, property lines, public roads, and turbine locations identified with labels will be provided. The report will also contain the full result output from the shadow flicker modeling software, including detailed tables and calendars showing the times of day and seasons when shadow flicker is most likely to be experienced. Exhibit 15 will provide a literature review of international, peer-reviewed research and government reports on shadow flicker and health effects. This information will be used to contextualize the results of the shadow flicker analysis to be provided in Exhibit 24.

A consistent receptor labelling system will be used to identify common receptors in the noise and shadow flicker studies in Exhibits 19 and 24. A discussion of which nonparticipating receptors will experience noise and shadow flicker impacts above established thresholds will be provided.

10. An assessment of various visual/flicker impact mitigation strategies including screening (landscaping), architectural design, visual offsets, eliminating, relocating or rearranging Facility components, automatic shutdown of turbines for flicker control, reduction of Facility component profiles, alternative technologies, Facility color and design, lighting options for work areas and safety requirements, and lighting options for turbines as required by the FAA (including the potential use of RADAR-activated aviation warning lights). Mitigation will also be assessed in relation to NYSDEC Program Policy DEP-00-2.

¹ Sensitive receptors will be defined, for purposes of noise and shadow flicker studies, as residences, hospitals, care centers, schools, libraries, places of worship, cemeteries, public campsites and summer camps, public parks, and New York State lands.

11. Identification and description of visually sensitive resources within the visual study area and assessment of probable impacts of the Facility on these resources.

b) The Visual Impact Assessment will include:

1. Viewshed maps will be developed based upon the ten-mile radius Study Area from Facility components to determine the extent of potential Facility visibility based on existing topography and vegetation, and the location and height of the proposed wind turbines, and other proposed above ground facilities. Viewshed maps will be of sufficient scale (1 inch = 2.8 miles overview map, and 1 inch = 2,000 feet detail map) in order to identify the individual visual resources and base map features. Each viewshed map (Blade tip topography, FAA light topography, blade tip vegetation and FAA light vegetation) will be presented on a topographic base map with visual resources identified by number. Inset will be included where additional detail is needed. Topographic viewshed maps will be prepared using 10-meter USGS DEM data (7.5-minute series), coordinates/dimensions of all proposed turbines, an assumed viewer height of 5.1 feet (1.55 meters), and GIS software. Maps will also be presented that depict visually sensitive sites, cultural and historical resources, representative viewpoint locations, photograph locations, public vantage points, and Landscape Similarity Zones. The maps will be divided into foreground (0 to 0.5 miles), mid-ground (0.5 to 5 miles), and background (beyond 5 miles) areas based on visibility distinction and distance zone criteria. A Preliminary List of Potential Viewpoint Locations for photographic simulations is included as Attachment 24(B).²
2. The VIA will include a detailed description of the methodology used to develop the viewshed maps, including software, baseline information, and sources of data. The viewshed analyses will be based upon the largest turbine model under consideration for the Facility and the height and location of any proposed overhead transmission structures. The viewshed analysis will also include permanent meteorological towers and substation equipment. The analyses will be run at blade tip height and illustrates maximum potential day time visibility, while the analyses run at the height of the FAA aviation warning light defines maximum potential nighttime visibility (based on the anticipated FAA lighting plan). The resulting topographic viewshed maps (one indicating blade tip visibility and one indicating nighttime visibility or turbine lighting) define the maximum area from which any turbine within the completed Facility could potentially be seen within the study area (ignoring the screening effects of existing vegetation and structures). A vegetation viewshed will also be prepared to illustrate the potential screening provided by forest vegetation. The vegetation viewshed will be prepared in the same manner as the topographic viewshed, except that a base vegetation layer will be created using the 2011 USGS National Land Cover Dataset (NLCD) to identify the mapped location of forest land (including the Deciduous Forest, Evergreen Forest, Woody Wetland and Mixed Forest NLCD classifications) within the visual study area. The NLCD data used in the viewshed

² Following completion of the Phase 1B Historic Architectural Survey, Applicant will consult with parties to determine whether the viewpoints outlined in Attachment 24(B) are sufficient to assess potential visual impacts from the project, or whether additional viewpoints are needed based on items identified in the Phase 1B process.

analysis will be verified for accuracy through an orthophoto comparative analysis. The VIA will also determine the applicability of the NLCD United States Forest Service (USFS) Tree Canopy Analytical Data (percent tree canopy cover and standard-error analysis) versus Tree Canopy Cartographic dataset in defining Facility visibility. Based on standard visual assessment practice, the mapped locations of the forest land will be assigned an assumed height of 40 feet and added to the DEM.

3. Identification of visually sensitive resources, as identified in (a)(1) above, using a variety of data sources including, but not limited to, digital geospatial data (shapefiles) national, state, county and local agency/program websites as well as websites specific to identified resources and resources identified by parties per the ongoing scoping and consultation processes.
4. Representative viewpoints will be selected based upon the past and future consultation with, and feedback provided by, municipal planning representatives, DPS, DEC, Department of State (DOS) Coastal Areas Management Unit, and OPRHP; while also balanced by the criteria below to ensure that a variety of views are represented. To the extent practicable, viewpoint selection will represent each Landscape Similarity Zone; all distance zones; and will illustrate views of different numbers of turbines and other Facility infrastructure, from a variety of viewer distances and directions, and under different lighting/sky conditions, to illustrate the range of visual change that could occur with the Facility in place. Viewpoint selection is also based upon the following criteria:
 - i. representative or typical views from unobstructed or direct line- of-sight views;
 - ii. significance of viewpoints, designated scenic resources, areas or features, as defined in (a)(1) above;
 - iii. level of viewer exposure, i.e., frequency of viewers or relative numbers, including residential areas, or high volume roadways;
 - iv. proposed land uses;
 - v. suggestions from local representatives and public information sources; and
 - vi. building/structure data collected for each potentially eligible property prepared in a format acceptable to OPRHP and DPS and submitted to OPRHP and DPS for review prior to completing the viewpoint selection;
 - vii. predicted visibility from review of preliminary viewshed mapping.
5. Representative viewpoints will be used to generate daytime photographic simulations of completed turbines and other visible Facility infrastructure. A subset of these simulations will be representative nighttime simulations selected from among the representative viewpoints. A Preliminary List of Potential Viewpoint Locations to be used for the photographic simulations is included as Attachment 24(B) to this stipulation. Prior to

submission of the Application, Lighthouse Wind will hold a public session in the Project Area, at which the Applicant will present interested persons with a map and photographs of the resources and proposed Viewpoint Locations identified in Attachments 24(A) and 24(B), and will provide an opportunity for members of the public to identify other appropriate resources or Viewpoint Locations for inclusion in the VIA. Notice of this session will be distributed in accordance with the PIP.

6. Due to the typical height of individual turbines and the geographic extent of a given wind power Facility, Applicant asserts that mitigation measures such as screening of individual turbines with earthen berms, fences, or planted vegetation will generally not be effective in reducing visibility. To the extent that site-specific mitigation measures are proposed at pertinent project locations (i.e. project facilities such as substation(s), operation and maintenance building, and equipment storage yards) and individual sensitive receptor locations, photographic simulations will be prepared as appropriate to show the effect of mitigation. Discussion of mitigation measures to address facility components other than turbines will also be included in the Application.
7. A study of potential shadow flicker impacts on nearby receptors, including an assessment of the predicted extent, frequency, and duration and as described in Section 24(a)(9) above.
8. A composite contrast rating for each viewpoint. All rating forms will be included in the Application. A narrative description of the existing view and overall visual effect representing the nature and degree of visual change resulting from construction and operation of the Facility on scenic resources and viewers represented by each of the selected viewpoints using comments provided by the rating panel members. The proposed categories for contrast description and analysis are included on the rating form and methodologies provided in Attachments 24(E) and 24(F).