Apex Lighthouse Wind Visual Impact Assessment

Proposed Project

Apex is currently developing a commercial scale wind powered generating facility. As presently envisioned, the Project consists of approximately 60-70 wind turbines and associated facilities located within an area of approximately 12,000 acres in the Town of Somerset, Niagara County, and the Town of Yates, Orleans County, New York (Project). In order to construct and operate the Project, Apex will seek authorization from the PSC for a Certificate of Environmental Compatibility and Public Need pursuant to 16 NYCRR, Chapter X, Certification of Major Electric Generating Facilities (Article X) of the Public Service Law.

Visual Impact Assessment Methodology

A visual impact assessment (VIA) will be designed to determine the extent of the facility visibility and assess the significance of any visual impact. Consistent with the Article X requirements, the components of the VIA will 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

Delineation of Project Study Area

Based on experience with past land based wind projects and guidance in the Department of Environmental Conservation (DEC) policy Assessing and Mitigating Visual Impact – DEP-00-2, the study area for the analysis will extend approximately 10 miles from the outermost Project components. ESS will confirm this area by conducting a preliminary bare earth viewshed map that will incorporate the Project limits, component heights and existing physical features. This distance is meant to capture "worst case" Project visibility, ensuring the inclusion of important aesthetic resources as well as visibility of significant Project features.

Identification of visually sensitive resources

Once the study area has been established ESS will consult multiple publically available resources in order to generate a comprehensive geodatabase of visually sensitive resources. As a general guide, ESS will follow the Article X protocol and DEC Visual Policy DEP-00-2 to determine the criteria for resources. These would include significance of viewpoints, designated scenic resources, areas or features including the following:

- Landmark landscapes;
- Wild, scenic or recreational rivers
- Forest preserve lands,
- Scenic vistas

- Conservation easement lands,
- Scenic byways designated by the federal or state governments;
- Scenic districts and scenic roads,
- Scenic areas of statewide significance; state
- State parks or historic sites;
- National Wildlife Refuges, State Game Refuges and State Wildlife Management Areas
- Sites listed on national or state registers of historic places;
- Areas covered by scenic easements,
- Public parks or recreation areas;
- State or federally designated trail, or one proposed for designation
- Locally designated historic or scenic districts and scenic overlooks; and
- High-use public areas;

ESS will coordinate with Apex to provide an opportunity for municipal, county, and state agencies to review the identified resources and provide any input including additional resources that they would like considered in the visual study. We have assumed timely review and input to allow maintaining the proposed schedule. All visual resources will be mapped and used to populate a geodatabase for inclusion the visual impact assessment.

Landscape Similarity Zones (LSZ) and Viewer Groups

In addition to broad regional physiography, a framework of landscape classification is used as the basis of scenic inventory and visual impact analysis and considers local structural qualities that are defined by vegetative cover and land use. These local characteristics help determine human spatial and visual experience and are used to create landscape similarity zones (LSZ). Landscape similarity zones are meant to represent the range of typical views for use in visual impact assessment. They are developed through GIS analysis of topographic, elevation, and land cover data (vegetation, structures and water) for the visual study area.

The visual experience of people who live, travel and recreate in the study area is considered when assessing the potential visual impact of a proposed Project. Viewer types are distinguished by the frequency and duration of their exposure to views of the surrounding landscape. This information, together with the baseline scenic quality of the landscape, determines the sensitivity of an existing view and therefore affects the evaluation of visual impact. For the purposes of this assessment, viewers/users have been grouped according to the categories described below.

Local Residents - Local residents include those who live and work within the visual study area. They generally view the landscape from their yards, homes, local roads and places of employment. Except when involved in local travel, residents are likely to be stationary, and have frequent or prolonged views of the landscape.

Travelers/Commuters - Commuters and travelers passing through the area view the landscape from vehicles on their way to and from work or other destinations. Their exposure to individual landscape features is generally brief or occasional

Recreational Users/Tourist - Tourists and vacationers come to the area for the purpose of experiencing its scenic, historic, or recreational resources. These viewers include sightseers, campers, boaters, and trail users. They may view the landscape on their way to a destination or from the destination itself. Some

may spend extended time in the area. These users also include residents and visitors involved in outdoor activities at parks and recreational facilities, and in undeveloped natural settings.

Viewshed Analysis

The purpose of the viewshed analysis is to determine the geographic areas within which there is a reasonable probability of Project visibility. The viewshed analysis considers the highest point of the Project components which would be the tip of the wind turbine blades. The viewshed mapping will be used to determine the sensitive viewing areas and locations of viewer groups in the facility vicinity which will include recreational areas, residences, businesses, historic sites (listed or eligible for listing on the State or National Register of Historic Places), and travelers (interstate and other highway users).

To create the viewshed analysis, 10-Meter USGS Digital Elevation Models (DEM's) are imported into a Geographic Information Systems (GIS) workspace for the Study Area. The proposed locations of Project components including wind turbines, any transmission structures, substation or other equipment are used as the origin of the analysis. A 5.1-foot receiver elevation is used to simulate the typical viewer eye height to determine whether an uninterrupted line of sight to the Project is available. Result represents the geographic area in which the Project would be visible under bare earth conditions. The bare earth viewshed result is considered the worst case visibility for a project and is inherently conservative since bare earth conditions do not exist in the Project Area and it does not consider screening by vegetation or others buildings.

Additional viewshed analysis will be conducted to account for the screen effects of surrounding vegetation. The vegetation data is based on the 2011 National Land Cover Database. This vegetation data is then combined with the Digital Elevation Model to identify the areas of vegetation excluded from the visible areas. This scenario is also conservative since screening by buildings or other structures present is not taken into account.

Viewshed figures depicting areas of Project visibility within the facility study area will be presented on a 1:24,000 scale recent edition topographic base map. A line of sight profile will also be done for any resources of statewide concern located within the VIA study area. The figures will be categorized as foreground, mid-ground and background areas based on visibility distinction and distance zone criteria.

Visually sensitive sites, cultural and historical resources, representative viewpoints, photograph locations, and public vantage points within the viewshed study area will be included on the map(s). Landscape similarity zones will also be included. It is important to note that because characteristics that influence visibility of the proposed Project (such as distance, viewpoint obstruction, atmospheric conditions, and angle from viewer) are not taken consideration in the viewshed analyses, being within the "visible" viewshed does not equate to actual Project visibility.

Field Verification of Visibility

Once the study area, Project location, potential Project visibility, landscape similarity zones, and sensitive sites are mapped, these data need to be confirmed and possibly revised through field observation and documentation.

Field maps of the visual study area will be generated that includes study area boundaries, the location of sensitive aesthetic resources, and the Project's topographic viewshed. A field crew will load the proposed wind turbines and other structure locations provided by Apex as a GIS file onto a GPS unit. This will allow

the crew to know their position relative to the Project during fieldwork to verify visibility, sensitive sites and any intensive land use, as well as any unmapped sites that might be considered sensitive (e.g., historic markers, special architectural features), or which offered open or unobscured views.

Photos will be taken with a full frame digital SLR camera with a minimum resolution of 20 megapixels and a 50mm normal perspective lens. These will be utilized in the preparation of simulations. Camera time displays were synchronized to the time displayed in the GPS unit used to record points. Data concerning weather and visibility, viewpoint location description, land cover and viewer position were recorded on field data sheets together with corresponding photo and GPS reference numbers.

Viewpoint Selection

Photos and other data from the field verification visit will represent the possible *viewpoints* or *candidate viewpoints.* Initially, viewpoints are selected based on potential project visibility and proximity to aesthetic resources of statewide significance. Viewpoints with some degree of Project visibility will be identified as candidates for simulation. Proximity to areas of concentrated settlement or intensive land use, and/or aesthetic resources of local significance will also be considered in viewpoint selection. Candidate viewpoints will be reviewed to assure adequate representation of landscape similarity zone, viewer perspective, distance from Project centerline, and geographic distribution along the project area.

Camera alignment will be used to determine which of the candidate viewpoints would best illustrate the appearance of the Project and the type and extent of typical views. ESS will coordinate with Apex and participate in discussions with agency representatives as part of the process to select thirty (30) final viewpoint locations. We have assumed timely review and input to allow maintaining the proposed schedule.

The thirty (30) final viewpoints selected for simulation and assessment will exhibit the following qualities:

- Provide clear, unobstructed views of the Project;
- Illustrate Project visibility from sensitive resources within the visual study area;
- Illustrate typical views from landscape similarity zones where views of the Project will be available;
- Provide views from a representative range of distances and viewer perspectives;

Visual Simulations

To show anticipated visual changes associated with the proposed Project, computer generated photo simulations will be created to portray an accurate photographic representation of the completed Project from each of the thirty selected viewpoint locations.

High resolution visual simulations will be produced using professional 2D and 3D visualization software. To create the simulations, the viewpoint location, proposed transmission structures and lines are modeled in Autodesk AutoCAD® along with the base information collected in during the field visit. All information will be placed in real world coordinates (State Plane NAD 83) to ensure the proper placement and environmental variable calculations. Highly accurate 3 dimensional scale models of the wind turbines and other structures will be placed in the proposed location using 3D Studio Max®. The models will include each individual wind turbine along with any other details necessary to accurately portray the proposed Project. The viewpoint locations are aligned to match the location, bearing, and focal length of the corresponding field photographs. Views are developed to match the sun and weather field conditions as

well as accurate depiction of the land surface and other land features to ensure precise light reflection, shadows, and diffusion. Due to the distance of the Project from some locations, haze may also be incorporated into the model for a more realistic view as dictated by actual conditions. One simulation will be produced from each location. Single frame fifty millimeter simulations representing a 40 degree field of view along with panorama simulations representing a 120 degree field of view will be produced for each variation and location. Panorama simulations are not used as the sole representation due to the printing and presentation limitations. The 50 millimeter representation will serve to provide an easily presentable simulation as well as minimal distortion of the view. Fifty millimeters also serves as the standard focal length accepted by the US Army Corps of Engineers as well as the Bureau of Land Management as a standard lens.

Visual Impact Rating and Report

Visual impact or contrast rating will be conducted for the resulting simulations. A form will be developed and include such things as description of existing scenic quality, viewing angles and atmospheric conditions, in addition to the actual rating of the proposed Project and the existing view. Possible mitigation measures will be derived from the DEC policy (DEP-00-2).

"Before" and "after" photographs, identical in every respect except for the Project components shown in the simulated views, will be prepared and printed on 11" x 17" format for every viewpoint selected. At this image size, the page should be held at approximately an "arm's length" so that the scene will appear at the correct scale. A "panel" of experts (raters, rating panel) will evaluate the Project's visual impact. The panel of experts will to rate the level of impact or contrast they believe the Project presents from each viewpoint on a scale of 1 to 4. The results will be developed into a composite rating by the panel members for each simulation. We have included 40 hours of effort for the panel.

The panel members will be asked to recommend mitigation strategies as may be needed that could potentially reduce visual impact as assessed for the viewpoint in question. The DEC mitigation strategy menu includes screening, relocation, camouflage, color, low profile, downsizing, alternate technologies, alternate materials, and lighting.

A final Report for Exhibit 24 will be prepared to present the results of the VIA. It will include the study methodology, existing conditions, resource inventory, selection of viewpoints, viewsehds, simulations (before and after), results of the panel review and any mitigation measures recommended. The shadow flicker report for this exhibit will be prepared separately by Apex.