Second Supplemental Environmental Impact Statement (SEIS2)

Arkwright Summit Wind Farm

Chautauqua County, New York

Prepared for:

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October 2015

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FOR THE

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ACRONYMS AND ABBREVIATIONS

Acronym/Abbreviation	Definition/Denotation
AMSL	Above Mean Sea Level
BMPs	Best Management Practices
dBA	A-weighted Decibels
DEIS	Draft Environmental Impact Statement
EAF	Environmental Assessment Form
EIS	Environmental Impact Statement
ESA	Endangered Species Act
FEIS	Final Environmental Impact Statement
GIS	Geographic Information Systems
GPS	Global Positioning System
NRHP	National Register of Historical Places
NYNHP	New York Natural Heritage Program
NYSDEC	New York State Department of Environmental Conservation
NYSOPRHP	New York State Office of Parks, Recreation, and Historic Preservation
SEQR	State Environmental Quality Review Act
SHPO	State Historic Preservation Office
SPDES	State Pollutant Discharge Elimination System
SPHINX	State Preservation Historical Information Network Exchange
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

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EXECUTIVE SUMMARY

This Second Supplemental Environmental Impact Statement (SEIS2) has been prepared for the proposed Arkwright Summit Wind Farm (the Project; formerly, the New Grange Wind Farm). Arkwright Summit Wind Farm, LLC (the Applicant), a wholly owned subsidiary of EDP Renewables North America LLC (or, EDPR), is proposing to construct a wind energy generation facility (and associated necessary Project infrastructure) in the Towns of Arkwright and Pomfret in Chautauqua County, New York (see Figure 1). The potential environmental impacts of the proposed Project are being reviewed under the State Environmental Quality Review Act (SEQRA) with the Town of Arkwright serving as the Lead Agency.

The SEQRA review of the Project began in 2008. This SEIS2 has been prepared to build upon the information and analysis in both the 2008 Draft Environmental Impact Statement (DEIS) and 2009 Supplemental Environmental Impact Statement (SEIS) that were previously prepared for the Project. This SEIS2 addresses all changes to the proposed action that have occurred subsequent to the SEIS, and includes additional studies and analyses. In general, the SEIS2 does not reiterate information from the previous DEIS or SEIS that remains accurate and unchanged. In addition, the SEIS2 is not a comprehensive response to public/agency comments received on the DEIS and SEIS; however, the SEIS2 does address substantive issues that were raised in these comments (in those instances where the comments are applicable to the currently proposed Project layout). A comprehensive responsiveness summary, which will specifically address all applicable and relevant remaining comments that have not been addressed by the SEIS2 or are still pertinent to the current layout of the Project will be included in the Final Environmental Impact Statement (FEIS) for the Project. The FEIS will be prepared and published for public review subsequent to the issuance of this SEIS2.

Project Description

The SEIS2 Project Layout consists of up to 36 turbines, which are anticipated to include 33 turbines with a nameplate capacity of 2.2 megawatts (MW) and 3 turbines with a nameplate capacity of 2.0 megawatts (MW), for a total anticipated nameplate generating capacity of 78.6 MW. The Applicant intends to select a turbine that includes both 2.2 and 2.0 MW nameplate capacity models; however, it is anticipated that both models will have the same physical dimensions and appearance. The Project has submitted an interconnection request and is currently proceeding through the System Reliability Impact Study with the New York Independent System Operator (NYISO) for 78.8 MW. Therefore, the proposed use of both 2.2 and 2.0 MW turbines allows the Applicant to maximize the energy generation potential of the proposed Project within the constraints of their approved interconnection request while minimizing the number of proposed wind turbines.

The largest wind turbines presently being considered for the Project are the Vestas V-110 wind turbines which are larger than the turbines proposed in the DEIS and SEIS. Assuming use of the Vestas V-110 turbines, the anticipated tower height for the Project, or "hub height" (height from foundation to top of tower), is approximately 95 meters (312 feet). The V-110 has a rotor diameter of 110 meters (361 feet), resulting in a total height of 150 meters (492 feet). The change to the Vestas V-110 turbines allows the use of fewer turbines than proposed in the DEIS (47) or the SEIS (44). In addition, to provide flexibility on final site selection, the Applicant is evaluating and seeks approval for 38 proposed turbine locations (although only 36 turbines will ultimately be built).

The current Project Site is very similar to the Project Site previously identified in the DEIS and SEIS. Relative to the DEIS and SEIS Project Layouts, the SEIS2 Project Layout minimizes potential environmental impacts by reducing the overall scale of the Project in the following ways:

- The number of proposed turbines has been reduced from 47 (DEIS), to 44 (SEIS), to 36 (SEIS2). Notably, seven proposed wind turbines located in the southeastern portion of the Project site have been eliminated from the Project layout. Otherwise, the proposed turbines in the SEIS2 Project Layout are for the most part located in close proximity to turbine locations that were previously evaluated in the SEIS.
- The total distance of proposed access roads has been reduced from 18 miles (DEIS), to 15.8 miles (SEIS), to 12.4 miles (SEIS2).
- The total areas of temporary and permanent soil disturbance resulting from construction of the SEIS2 Project Layout total 289.5 and 69.5 acres (respectively), which is reduced from 359 and 90 acres (respectively) in the SEIS Project Layout and 375 and 89 acres (respectively) in the DEIS Project Layout.
- The SEIS2 Project Layout is sited on many of the same parcels that were previously included in the DEIS and SEIS. The Project Site as presented in the DEIS included 5,930 acres. The SEIS Project Layout was somewhat more dispersed and included 5,964 acres. The Project Site for the SEIS2 has been reduced to 3,883 acres.
- The DEIS and SEIS Project Layouts included a 1.4-mile segment of overhead collection line in the southeastern portion of the Project which is no longer proposed as part of the Project.

Regulatory Process

The regulatory process for the Arkwright Summit Wind Farm Project is still generally the same as described previously in the DEIS and SEIS. This SEIS has been prepared by Environmental Design & Research, Landscape Architecture, Engineering, & Environmental Services, D.P.C. (EDR) of Syracuse, New York. The SEIS2 is intended to document changes in the proposed project since the DEIS and SEIS. The documentation in the SEIS2 includes changes in the project design and its potential impacts and benefits in order to provide a basis for informed public comment and decision-making, and to facilitate the Project's environmental review process in accordance with the requirements of New York State's Environmental Quality Review Act (SEQRA).

The Applicant is now proposing to install turbines with a total maximum height of 492 feet. This would require an Amendment to the Town of Arkwright Zoning Ordinance Article VI-A Wind Energy Facilities (Local Law No. 2 of 2007) to allow for the construction of wind turbines taller than 420 feet in total height. The Town of Arkwright Town Board has recently introduced an amendment to Section 659(13) of Article VI-A of the zoning ordinance which would increase the permissible height of any wind turbine to a maximum of 500 feet. In the alternative, if the Town does not amend the local law, the Applicant will seek a variance for the height of the turbines.

Purpose, Need, and Benefit

The purpose, need and benefit of the Arkwright Summit Wind Farm Project are still generally the same as described in the DEIS and SEIS. This information has been updated relative to the discussion presented in the DEIS and SEIS due to the changes in the proposed Project layout (and wind turbine model) as well as significant legislative and policy initiatives that have occurred subsequent to the publication of the DEIS in 2008 and SEIS in 2009 that further encourage renewable energy projects such as the Arkwright Summit Wind Farm and explain the need for additional energy generation from renewable sources such as wind. The Project will help the State achieve the goals of the 2015 State Energy Plan. State Energy Law 6-104 requires the State Energy Planning Board to adopt a State Energy Plan. The latest iteration of the New York State Energy Plan was announced on June 25, 2015. The State Energy Plan contains a series of policy objectives and coordinates with the REV initiative and the objectives to increase the use of energy systems that enable to the State to significantly reduce GHG emissions while stabilizing energy costs. According to the Plan, the Plan is a "comprehensive strategy to create economic opportunities for communities and individual customers throughout New York." Through the State Energy Plan, New York has committed to achieving a 40% reduction in GHG emissions from 1990 levels by 2030 and reducing total carbon emissions 80% by 2050. In addition, the State Energy Plan calls for 50% of generation of electricity from renewable energy sources by 2030. According to the Plan, "Renewable Energy sources, such as wind, will play a vital role in reducing electricity price volatility and curbing carbon emissions" (NYSEPB, 2015). The Arkwright Summit Wind Farm fully advances the objectives of the State Energy Plan and assists the State in achieving the 50% renewable energy generation objective.

In fulfillment of President Obama's commitment under the 2013 Climate Action Plan, EPA proposed "Clean Power Plan" regulations in 2014 establishing a framework for states to regulate carbon dioxide emissions from existing fossil fuel-fired electric generating units. (See 79 Federal Register 34830; June 18, 2014). Once the guidelines are issued, states must develop plans that explain how they will achieve those guidelines. Nationwide, the proposal calls for reducing CO2 from the power sector by approximately 30% from 2005 emission levels by 2030. The proposal establishes emission rate-based CO2 goals for each state as well as guidelines for the development, submission and implementation of state plans to achieve those goals. The proposal relies on four basic building blocks: (1) reducing the carbon intensity of generation at individual units through heat rate improvements; (2) substituting less carbon-intensive generating units (e.g., replacing coal with natural gas); (3) increasing reliance on low or zero-carbon generation sources such as solar and wind; and (4) increasing reliance on demand-side energy efficiency programs.

Unlike other states with a RPS, in New York, the New York State Energy Research and Development Authority (NYSERDA) is responsible for obtaining the targets established in the RPS through competitive bidding and contract procurements. As of the date of this SEIS2, NYSERDA has conducted 10 Main Tier (larger, utility scale resources) solicitations in pursuit of the RPS target. From the nine completed solicitations, NYSERDA currently has contracts with electricity generators for 65 large-scale projects, including the Arkwright Summit Wind Farm Project (NYSERDA, 2015). These projects will add more than 2,035 MWs of new renewable capacity to the State's energy mix. However, as of December 2014, the State, through NYSERDA, has only procured enough renewable energy to meet 56% of the RPS targets. (NYSERDA, 2015).

Summary of Potential Impacts

In accordance with requirements of the SEQRA process, potential impacts arising from the proposed action were evaluated in the DEIS and SEIS with respect to an array of environmental and cultural resources. The identified and analyzed potential impacts discussed in detail in the DEIS and SEIS are very similar for, and still relevant to, the revised project described in this SEIS2.

Construction of the current Project will result in the permanent and temporary disturbance of up to 359 acres of soil and 598 acres of vegetation, most of which is forest land or active agriculture. In addition, approximately 48.9 acres of wetland could be disturbed by Project construction. However, the majority of these impacts will be temporary and will require U.S. Army Corp of Engineers approval. A total of 69.5 acres will be converted to built facilities, including 53.6 acres of forest land and 5.78 acres of wetland. Project construction will also result in some level of temporary disturbance and congestion on area roadways. The impacts from the revised Project are anticipated to be generally less than those described in the previous DEIS and SEIS because only 36 turbines will be constructed instead of the 47 (DEIS) or 44 (SEIS) turbines previously proposed.

Project operation is expected to result in some level of avian and bat collision mortality. Additionally, the turbines will be visible from many locations within the surrounding area, particularly in agricultural areas with wide open fields, but will also be fully or partially screened from viewers in many locations (e.g., in forested areas, and developed settings). Only very minor changes in land use within the Project area are anticipated as a result of Project implementation. The

Project is expected to generate consistent revenue in PILOT payments to local taxing jurisdictions, while requiring very little in terms of municipal services.

Summary of Mitigation Measures

Various measures will be taken to avoid, minimize and/or mitigate potential environmental impacts. The identified mitigation measures discussed in detail in the DEIS and SEIS are very similar for, and still relevant to, the revised project described in this SEIS2.

Specific measures designed to mitigate or avoid adverse potential environmental impacts during Project construction or operation include:

- Siting the Project away from population centers and areas of substantial residential development.
- Siting turbines and access roads so as to avoid or minimize impacts to wetlands and streams.
- Using the routing of existing logging roads and farm lanes for turbine access whenever possible to minimize disturbance to forest and agricultural land.
- Utilizing 'best practice' construction techniques that minimize disturbance to vegetation, streams, and wetlands.
- Implementing agricultural protection measures to avoid, minimize, or mitigate impacts on agricultural land and farm operations.
- Limiting turbine lighting to the minimum allowed by the Federal Aviation Administration (FAA) to reduce nighttime visual impacts, and following lighting guidelines to reduce the potential for bird collisions.
- Entering into a PILOT agreement with the local taxing jurisdictions to provide a significant predictable level of funding for the town, county, and school districts for the operational life of the Project.
- Close coordination with local first responders and other relevant community support services.

Alternatives

Alternatives to the proposed Project that were considered and evaluated include alternative Project area, alternative project design/layout, alternative project size, alternative technologies, alternative construction phasing, and no action. The identified alternatives discussed in detail in the DEIS and SEIS are very similar for, and still relevant to, the revised project described in this SEIS2.

Since the preparation of the DEIS and SEIS, the Applicant has revised the wind turbine model being considered for the Project from the Vestas V-90 to the Vestas V-110. This SEIS2 assumes that the Project will use Vestas V-110 WTGs. The Vestas V-110 is a larger wind turbine than the Vestas V-90 with respect to hub height, rotor diameter, and total height. Assuming use of the Vestas V-110 turbine, the anticipated tower height for the Project, or “hub height” (height from foundation to the rotor hub), is approximately 95 meters (312 feet). The Vesta V-110 has a rotor diameter of 110 meters (361 feet), resulting in a total height of 150 meters (492 feet). The Vestas V-110 also has a higher production capacity than the Vestas V-90. Fewer turbines are proposed in the current layout as a result of the increased nameplate capacities of the larger wind turbine. Taller turbines can create the potential for impacts due to setback issues, the potential for increased visibility, and higher rotor swept zones. However, when compared to a larger number of shorter turbines, the overall benefits associated with the energy production at the taller height and the net reduction of impacts due to fewer turbines outweigh the relatively minor differences in potential environmental impacts associated with the increased wind turbine dimensions.

Effects on Use and Conservation of Energy Resources

The proposed Project will have significant, long-term beneficial effects on the use and conservation of energy resources. The identified effects on the use and conservation of energy resources discussed in detail in the DEIS and SEIS are very similar for, and still relevant to, the revised project described in this SEIS2. Energy will be expended during the construction phases of the Project, as well as for the maintenance of the wind turbines and support facilities on-site. However, the operating Project will possess a maximum of 78.6 MW of electricity generation capacity without consuming water or producing toxic emissions on an ongoing basis. This greatly exceeds the energy required to construct and operate the Project. Assuming that the Project generates approximately 33% of its nameplate generating capacity, this is enough power to support between approximately 31,600 average homes in New York State (based on the New York and national averages).

The Project will add to and diversify the state’s sources of power generation, accommodate future growth in power demand through the use of a renewable resource (wind), and over the long term will displace some of the state’s older, less efficient, and less environmentally sustainable sources of power and/or the amount of energy imported into the state.

1.0 DESCRIPTION OF PROPOSED ACTION

This Second Supplemental Environmental Impact Statement (SEIS2) has been prepared for the proposed Arkwright Summit Wind Farm (the Project; formerly, the New Grange Wind Farm). Arkwright Summit Wind Farm, LLC (the Applicant), a wholly owned subsidiary of EDP Renewables North America LLC (or, EDPR), is proposing to construct a wind energy generation facility (and associated necessary Project infrastructure) in the Towns of Arkwright and Pomfret in Chautauqua County, New York (see Figure 1). The potential environmental impacts of the proposed Project are being reviewed under the State Environmental Quality Review Act (SEQRA) with the Town of Arkwright serving as the Lead Agency.

As described in greater detail below (see Section 1.12 of this SEIS2), the SEQRA review of the Project began in 2008. This SEIS2 has been prepared to build upon the information and analysis in both the 2008 Draft Environmental Impact Statement (DEIS) and 2009 Supplemental Environmental Impact Statement (SEIS) that were previously prepared for the Project. This SEIS2 addresses all changes to the proposed action that have occurred subsequent to the SEIS, and includes additional studies and analyses. In general, the SEIS2 does not reiterate information from the previous DEIS or SEIS that remains accurate and unchanged. In addition, the SEIS2 is not a comprehensive response to public/agency comments received on the DEIS and SEIS; however, the SEIS2 does address substantive issues that were raised in these comments (in those instances where the comments are applicable to the currently proposed Project layout). A comprehensive responsiveness summary, which will specifically address all applicable and relevant remaining comments that have not been addressed by the SEIS2 or are still pertinent to the current layout of the Project will be included in the Final Environmental Impact Statement (FEIS) for the Project. The FEIS will be prepared and published for public review subsequent to the issuance of this SEIS2.

1.1 PROJECT DESCRIPTION

The following terms are used throughout this document to describe the proposed action:

Applicant. Refers to Arkwright Summit Wind Farm, LLC, formerly New Grange Wind Farm LLC, a wholly owned subsidiary of EDPR.

Project. Refers to all activities associated with the construction, operation, and individual components of the Arkwright Summit Wind Farm, including, but not limited to, turbines, electrical collection lines, access roads, laydown areas, and other facilities.

Project Site. Refers to the parcels of land where the Project will be placed. Arkwright Summit Wind Farm, LLC has obtained consent from all landowners within the Project Site.

SEIS2 Project Layout. Refers to the currently proposed layout of the Project as described herein (see Figure 2), which is distinguished from previous layouts of the Project that were evaluated in the DEIS (the DEIS Project Layout) and SEIS (the SEIS Project Layout).

The Applicant is proposing to develop a wind-powered generating facility. As presently envisioned, the SEIS2 Project Layout consists of up to 36 turbines, which are anticipated to include 33 turbines with a nameplate capacity of 2.2 megawatts (MW) and 3 turbines with a nameplate capacity of 2.0 megawatts (MW), for a total anticipated nameplate generating capacity of 78.6 MW. The Applicant intends to select a turbine that includes both 2.2 and 2.0 MW nameplate capacity models; however, it is anticipated that both models will have the same physical dimensions and appearance. The Project has an approved interconnection agreement with the New York Independent System Operator (NYISO) for 78.8 MW. Therefore, the proposed use of both 2.2 and 2.0 MW turbines allows the Applicant to maximize the energy generation potential of the proposed Project within the constraints of their approved interconnection agreement while minimizing the number of proposed wind turbines. In addition, to allow for flexibility on final site selection, the Applicant is evaluating and seeks approval for 38 proposed turbine locations (although only 36 turbines will ultimately be built). Therefore, 2 turbines are shown as “Alternate Wind Turbines” in Figures 2 and 3.

The largest wind turbines presently being considered for the Project are the Vestas V-110 wind turbines. For the purpose of presenting a conservative analysis, the assessment of potential environmental impacts throughout this SEIS2 assumes that the Project will use Vestas V-110 wind turbines. Each wind turbine consists of three major mechanical components: the tower, nacelle, and rotor. Assuming use of the Vestas V-110 turbines, the anticipated tower height for the Project, or “hub height” (height from foundation to top of tower), is approximately 95 meters (312 feet). The V-110 has a rotor diameter of 110 meters (361 feet), resulting in a total height of 150 meters (492 feet). Additional information regarding the physical characteristics of the Vestas V-110 turbines is included in Section 1.5 of this SEIS2.

As described above, the Applicant is proposing to install turbines with a total maximum height of 492 feet. This would require an Amendment to the Town of Arkwright Zoning Ordinance Article VI-A Wind Energy Facilities (Local Law No. 2 of 2007) to allow for the construction of wind turbines taller than 420 feet in total height. The Town of Arkwright Town Board has recently introduced an amendment to Section 659(13) of Article VI-A of the zoning ordinance which would increase the permissible height of any wind turbine to a maximum of 500 feet. In the alternative, if the Town does not amend the local law, the Applicant will seek a variance for the height of the turbines. The potential need for an amendment to the local law or variance is further discussed in Section 2.13 of this SEIS2.

In addition to the turbines, the SEIS2 Project Layout includes construction and operation of 1 permanent meteorological tower, approximately 12.4 miles of gravel access roads, approximately 18 miles of underground (buried) electrical collection lines and communication cables, an operations and maintenance (O&M) facility, a 5.9-mile overhead Generator Lead line, and a substation and associated point of interconnection (POI) switchyard. In addition to the permanent components of the Project, the Project will require a temporary laydown yard and construction work space, including, but not limited to, areas to store Project components (laydown yards), construction vehicle parking areas, and cleared areas for turbine assembly. These Project components are described in greater detail below in Section 1.5 of this SEIS2. The SEIS2 Project Layout is depicted in Figure 2.

1.1.1 Summary of Project Changes in the SEIS2 Relative to the SEIS and DEIS

Relative to the DEIS and SEIS Project Layouts, the SEIS2 Project Layout minimizes potential environmental impacts by reducing the overall scale of the Project in the following ways:

- The number of proposed turbines has been reduced from 47 (in the DEIS), to 44 (in the SEIS), to 36 (in the SEIS2). Notably, seven proposed wind turbines located in the southeastern portion of the Project site (i.e., south of County Route 72/Burnham Road in the vicinity of Ruttenburg Road) have been eliminated from the Project layout. Otherwise, the proposed turbines in the SEIS2 Project Layout are for the most part located in close proximity to turbine locations that were previously evaluated in the SEIS (see Figure 3).
- The total distance of proposed access roads has been reduced from 18 miles (in the DEIS), to 15.8 miles (in the SEIS), to 12.4 miles (in the SEIS2).
- The total areas of temporary and permanent soil disturbance resulting from construction of the SEIS2 Project Layout total 289.5 and 69.5 acres (respectively), which is reduced from 359 and 90 acres (respectively) in the SEIS Project Layout and 375 and 89 acres (respectively) in the DEIS Project Layout.
- The SEIS2 Project Layout is sited on many of the same parcels that were previously included in the DEIS and SEIS. The Project Site as presented in the DEIS included 5,930 acres. The SEIS Project Layout was somewhat more dispersed and included 5,964 acres. The Project Site for the SEIS2 has been reduced to 3,883 acres. The SEIS2 Project Site considered herein is shown in comparison to the SEIS Project Site in Figure 3.

- The DEIS and SEIS Project Layouts also included a 1.4-mile segment of overhead collection line in the southeastern portion of the Project. The 1.4-mile overhead collection line is no longer proposed as part of the Project.

The remaining aspects of the SEIS2 Project layout that have been modified since the SEIS include the following:

- The total distance of proposed underground collection lines has remained approximately the same; 21 miles (in the DEIS), to 17.9 miles (in the SEIS), to 18 miles (in the SEIS2).
- The SEIS2 Project Layout includes a 5.9-mile overhead generator lead that will connect the switchgear facility in the Town of Arkwright with the POI substation/switchyard in the Town of Pomfret (see Figure 2).

The differences between the SEIS2 Project Layout relative to the DEIS and SEIS Project Layouts are depicted in Figure 3: Project Layout Comparison and summarized in Table 1.

Table 1. Summary of SEIS2 Project Layout Relative to the DEIS and SEIS Project Layouts.

Proposed Project Component	**Description, Count, and/or Distance**		
	SEIS2 Project Layout (2015)	**SEIS Project Layout (2009)**	**DEIS Project Layout (2008)**
Wind Turbine Model & Dimensions (assumes largest model under consideration)	Vestas V-110 Hub Height: 95m (312') Rotor Diameter: 110m (361') Total Height: 150m (492')	Vestas V-90 Hub Height: 80m (262') Rotor Diameter: 90m (295') Total Height: 125m (410')	Vestas V-90 Hub Height: 80m (262') Rotor Diameter: 90m (295') Total Height: 125m (410')
Wind Turbines	36 (38 locations being considered)	44	47
Project Site	3,883 acres 87 parcels	5,964 acres 116 parcels	5,930 acres 117 parcels
Temporary Disturbance	289.5 acres	359 acres	375 acres
Permanent Disturbance	69.5 acres	90 acres	89 acres
Meteorological Towers	1	4	3
Access Roads	12.4 miles	15.8 miles	18 miles
Collection Lines	18 miles underground 0 miles overhead	17.9 miles underground 5.4 miles overhead	21 miles underground 4.7 miles overhead
O&M Facility	5,000-8,000 square-foot building 2-acre site	5,000-8,000 square-foot building 8.7-acre site	5,000-8,000 square-foot building 5-acre site
Staging Areas	6.7 acres	8.3 acres	10 acres
Generator Lead	5.9 miles (overhead)	-	-
POI Substation	2 acres	5 acres	4 acres

As indicated in Table 1, the Applicant is proposing the use of a taller wind turbine with a larger rotor diameter (relative to what was considered in the DEIS and SEIS) to maximize energy production based on the site-specific wind resource analyses. Fewer turbines are proposed in the current layout as a result of the increased nameplate capacities of the larger wind turbine. Taller turbines can create the potential for impacts due to setback issues, the potential for increased visibility, and higher rotor swept zones. However, when compared to a larger number of shorter turbines, the overall benefits associated with the energy production at the taller height and the net reduction of impacts due to fewer turbines outweigh the relatively minor differences in potential environmental impacts. See Section 4.0 of this SEIS2 for additional analysis of Project alternatives.

Consistent with the siting criteria presented in the DEIS and SEIS, all turbines are located a minimum of 500 feet from existing roads and at least 1,200 feet from nonparticipating neighboring residential structures. Because of environmental considerations, landowner decisions, and potential unforeseen construction issues, all of the potential turbine locations may be subject to minor adjustments. However, any such adjustments will not change the affected resources, increase environmental impacts, or alter proposed mitigation, as described herein.

To assist in characterizing the potential environmental impacts associated with the current Project layout (relative to the characterization of impacts presented in the DEIS and SEIS), the SEIS2 includes the following revised and/or updated support studies:

- Preliminary Blasting Plan (Appendix A)
- Decommissioning Plan (Appendix B)
- Agency Correspondence (Appendix C)
- Geotechnical Investigation Reports (Appendix D)
- Wetland and Waterbodies Report (Appendix E)
- Spill Control and Countermeasure Plan (Appendix F)
- Stormwater Pollution Prevention Plan (Appendix G)
- Avian and Bat Studies (Appendix H)
- Invasive Species and Noxious Weed Control Plan (Appendix I)
- Second Supplemental Visual Resources Assessment (Appendix J)
- Updated Shadow Flicker Report (Appendix K)
- Supplemental Phase 1B Archaeological Survey (Appendix L)
- Historic-Architectural Resources Summary Report (Appendix M)
- Environmental Sound Survey and Noise Impact Assessment (Appendix N)
- Complaint Resolution Procedure (Appendix O)
- Transportation Route Review (Appendix P)

- Communication Studies (Appendix Q)
- NYSDAM Guidelines for Agricultural Mitigation for Wind Power Projects (Appendix R)

1.2 PROJECT LOCATION

As described in the DEIS and SEIS, the Project is located in northwestern corner of Chautauqua County, New York (Figure 1). The proposed Project is located approximately 5.2 miles southeast of Lake Erie, approximately 4.8 miles southeast of the City of Dunkirk, 3.7 miles south-southeast of the Village of Fredonia, 3.4 miles southwest of the Village of Forestville, and 4.6 miles northeast of the Village of Cassadaga. The Project is located within the Towns of Arkwright and Pomfret, and will occur on approximately 3,883 acres of leased land (the Project Site) located off of State Route 83, Center Road, Ball Road, Straight Road, Brainard Road, and Webster Road (see Figure 2). As noted previously, the size of the SEIS2 Project Site has decreased from the 5,964 acres included in the SEIS Project Site (see Figure 3), primarily due to changes in wind turbine locations and the elimination of overhead collection lines from the Project Layout. Otherwise, in terms of physiography and land use, the Project Site is as described in the DEIS and SEIS.

1.2.1 Project Participation

Approximately 59 landowners are participating in the Project. These landowners own the 87 parcels of land that make up the Project Site. The Applicant has secured sufficient acreage under lease and easement option agreements to construct the Project.

1.3 PROJECT FACILITY OWNER/DEVELOPER/OPERATOR

Arkwright Summit Wind Farm LLC (the Applicant), is a wholly owned indirect subsidiary of EDP Renewables North America LLC. EDPR develops, constructs, owns, and operates wind farms throughout the United States, including New York, Iowa, Illinois, Indiana, Oklahoma, Texas, Oregon, Minnesota, Washington, and Kansas. EDPR wind farms in New York include the Maple Ridge Wind Farm in Lewis County, New York (50 percent owned by EDPR), Marble River Wind Farm in Clinton County, New York and the Madison Wind Farm in Madison County, New York. At the end of 2014, EDPR owned approximately 3,805 MW of operating wind energy capacity in North American with an additional 299 MW under construction. In New York State, approximately 400 MW of wind energy projects are currently under development.

1.4 PROJECT PURPOSE, NEED AND BENEFIT

This section describes the purpose of the Project, how it would help meet economic and environmental needs, and how the proposed action is consistent with goals, objectives, orders, and directives issued by the executive and legislative branches of the United States and New York Governments. This information has been updated relative to the discussion presented in the SEIS due to the changes in the proposed Project layout (and wind turbine model) as well as significant legislative and policy initiatives that have occurred subsequent to the publication of the SEIS in 2009.

1.4.1 Project Purpose

As described in the DEIS and SEIS, the purpose of the proposed Project is to create an economically viable wind-powered electrical-generating facility that will provide a source of renewable energy to the New York power grid to:

- Satisfy regional energy needs in an efficient and environmentally sound manner;
- Supplement and offset fossil-fuel electricity generation in the region, with emission-free, wind-generated energy;
- Reduce the amount of electricity imported to New York State;
- Realize the full potential of the wind resource in the Project Site;
- Promote the long-term economic viability of rural areas in New York; and
- Assist New York State in meeting its proposed Renewable Portfolio Standard and State Energy Plan goals for the consumption of renewable energy in the State (see below).

The Project is expected to have an average annual net capacity factor (NCF) of approximately 33%, which is typical for most operational commercial wind farms in New York State. Annual NCF is a means of measuring the productivity of a wind power project (or another power production facility), and this factor compares the actual, or predicted, production of a facility over the course of a year as compared to the potential production if the facility was running at full capacity for the full year. A 33% NCF means that on average, a facility will generate approximately 33% of its potential output over a given year. For a wind project, this does not mean that it will be generating power only 33% of the time (the turbines may actually be generating power 65% to 90% of the time, just not always at full capacity), but rather the Project will generate approximately 33% of its potential maximum output over the course of each year.

Total net electricity delivered to the existing New York power grid is expected to be approximately 227,217 megawatt hours (MWh) (i.e., (33 turbines x 2.2 MW + 3 turbines x 2.0 Mw) x 24 hours/day x 365 days x 33% NCF), or enough electricity to meet the average annual consumption of 31,558 households, based on the average annual electric consumption of 7.2 MWh for New York State residences (U.S. Energy Information Administration [USEIA], 2015).

1.4.2 Public Need and Benefits to Be Derived From Project

The public need and benefits from the Project are best understood in the context of the challenges posed by addressing climate change and energy issues facing New York State. The immediate benefits of utility scale renewable projects, such as the Arkwright Summit Wind Farm, include economic development and jobs for the community, greater stability in customer bills, cleaner air, and compliance with State and Federal mandates. In the long run, as recognized by the newly issued State Energy Plan, benefits may be similar to those New York enjoys from the State's hydroelectricity facilities today, below-market electricity prices and a healthier environment.

The Project will help the State achieve its goals of reducing carbon emissions that contribute to climate change in the electricity generation industry.

Global climate change has been recognized as one of the most important environmental challenges of our time. (See New York State Climate Action Plan Interim Report, November 2010; DEC's Commissioner Policy 49, issued October 22, 2010; DEC Guidance Assessing Energy Use and Greenhouse Gas Emissions in Environmental Impact Statements, issued July 15, 2009). There is scientific consensus that human activity is increasing the concentration of greenhouse gases (GHGs) in the atmosphere and that this, in turn, is leading to serious climate change. By its nature, climate change will continue to impact the environment and natural resources of the State of New York. (See DEC Guidance). Historically, New York State has been proactive in establishing goals to reduce GHG emissions, including Executive Order 24, which seeks to reduce GHG emissions by 80% by the year 2050 and also includes a goal to meet 45% of New York's electricity needs through improved energy efficiency and clean renewable energy by 2015. (See New York State Executive Order 24). The overwhelming majority of CO2 emissions in New York – estimated at approximately 250 million tons of CO2 equivalent per year- from result fuel combustion. Overall fuel combustion accounts for approximately 89% of total GHG emissions in New York State.

In an effort to encourage and incentivize the shift of New York State's energy sector from reliance on GHG emitting fuel sources to renewable energy sources, the State has established a Renewable Portfolio Standard (RPS) which initially called for an increase in renewable energy used in the State to 25% by the year 2013 (PSC, 2004). Following a comprehensive mid-course review and in an effort to further spur renewable energy project development, in an Order issued in January 2010, the New York Public Service Commission (PSC) expanded the RPS target from 25% to 30%

and extended the target date from 2013 to 2015. The RPS is expected to reduce CO2 emissions by 50 million tons over the life of the projects (NYSERDA, 2015).

Unlike other states with an RPS, in New York, the New York State Energy Research and Development Authority (NYSERDA) is responsible for obtaining the targets established in the RPS through competitive bidding and contract procurements. As of the date of this SEIS2, NYSERDA has conducted 10 Main Tier (larger, utility scale resources) solicitations in pursuit of the RPS target. From the nine completed solicitations, NYSERDA currently has contracts with electricity generators for 65 large-scale projects, including the Arkwright Summit Wind Farm Project (NYSERDA, 2015). These projects will add more than 2,035 MWs of new renewable capacity to the State's energy mix. However, as of December 2014, the State, through NYSERDA, has only procured enough renewable energy to meet 56% of the RPS targets. (NYSERDA, 2015).

The PSC has extended the original target of 30% by 2015 and has authorized NYSERDA to issue additional solicitations in 2015 and in the future if NYSERDA determined that market conditions were appropriate. As part of this authorization, NYSERDA has proposed a comprehensive Clean Energy Fund (CEF) to ensure continuity of the State's clean energy programs after 2015. The CEF is one part of New York State's Reforming the Energy Vision (REV) initiative, a 10-year $5 billion funding program to support clean energy market development and innovation and to secure renewable energy resources as part of New York's clean energy future. As stated by the PSC in the REV Order, "A significant increase in the penetration of renewable resources is essential to meeting our objectives, state goals and proposed federal requirements" (PSC, 2015).

As mentioned above, in NYSERDA's latest completed RPS solicitation, Arkwright Summit Wind Farm was awarded a contract for procurement and the opportunity to contribute to NYSERDA meeting the targets in the RPS.

The Project will also help the State achieve the goals of the 2015 State Energy Plan. State Energy Law 6-104 requires the State Energy Planning Board to adopt a State Energy Plan. The latest iteration of the New York State Energy Plan was announced on June 25, 2015. The State Energy Plan contains a series of policy objectives and coordinates with the REV initiative and the objectives to increase the use of energy systems that enable to the State to significantly reduce GHG emissions while stabilizing energy costs. According to the Plan, the Plan is a "comprehensive strategy to create economic opportunities for communities and individual customers throughout New York." Through the State Energy Plan, New York has committed to achieving a 40% reduction in GHG emissions from 1990 levels by 2030 and reducing total carbon emissions 80% by 2050. In addition, the State Energy Plan calls for 50% of generation of electricity from renewable energy sources by 2030. According to the Plan, "Renewable Energy sources, such as wind, will play a vital role in reducing electricity price volatility and curbing carbon emissions" (NYSEPB, 2015). Arkwright Summit Wind Farm fully advances the objectives of the State Energy Plan and assists the State in achieving the 50% renewable energy generation objective.

Further, federal policy has recognized the need for increased supply of energy to the U.S., and for new renewable energy resources. The Project fulfills a need for the production and transmission of renewable energy, which would serve the public interest. The Project is consistent with Executive Order 13212 (dated May 18, 2001), which states, "The increased production and transmission of energy in a safe and environmentally sound manner is essential to the well-being of the American people. In general, it is the policy of this Administration that executive departments and agencies shall take appropriate actions, to the extent consistent with applicable law, to expedite projects that will increase the production, transmission, or conservation of energy."

On June 25, 2013, President Obama announced the Climate Action Plan, a national plan for tackling climate change. The three sections of the Plan focus on 1) steps to cut carbon pollution in the United States, including standards for both new and existing power plants, 2) actions to prepare the U.S. for the impacts of climate change, and 3) plans to lead international efforts to address global climate change. The Plan directs the Environmental Protection Agency (EPA) to establish the first ever restrictions on carbon pollution from power plants, the largest source of unregulated CO2 emissions in the U.S. It also fast-tracks permitting for renewable energy projects on public lands; increases funding for clean energy technology and efficiency improvements; calls for improved efficiency standards for buildings and appliances, as well as heavy trucks; establishes the first-ever Federal Quadrennial Energy Review to encourage strategic national energy planning; and outlines plans for cutting greenhouse gas emissions from hydrofluorocarbons and methane. The Plan states, "With abundant clean energy solutions available, and building on the leadership of states and local governments, we can make continued progress in reducing power plant pollution to improve public health and the environment while supplying the reliable, affordable power needed for economic growth. By doing so, we will continue to drive American leadership in clean energy technologies" (Executive Office of the President, 2013).

In fulfillment of President Obama's commitment under the 2013 Climate Action Plan, EPA proposed "Clean Power Plan" regulations in 2014 establishing a framework for states to regulate carbon dioxide emissions from existing fossil fuel-fired electric generating units. (See 79 Federal Register 34830; June 18, 2014). Once the guidelines are issued, states must develop plans that explain how they will achieve those guidelines. Nationwide, the proposal calls for reducing CO2 from the power sector by approximately 30% from 2005 emission levels by 2030. The proposal establishes emission rate-based CO2 goals for each state as well as guidelines for the development, submission and implementation of state plans to achieve those goals. The proposal relies on four basic building blocks: (1) reducing the carbon intensity of generation at individual units through heat rate improvements; (2) substituting less carbon-intensive generating units (e.g., replacing coal with natural gas); (3) increasing reliance on low or zero-carbon generation sources such as solar and wind; and (4) increasing reliance on demand-side energy efficiency programs. Each state must then develop a plan that explains how they intend to achieve their state-specific CO2 emission rate goal that includes enforceable CO2 emission limits applicable to each affected unit. EPA plans to finalize the rule by summer 2015; state plans would be due by June 30, 2016. States would be expected to begin making CO2 emission reductions by 2020, with full compliance to be achieved by 2030.

In support of the President's efforts to diversify the U.S's clean energy mix, the U.S. Department of Energy (2015a) recently issued its "Wind Vision" which concluded that the benefits of wind energy are substantial and include:

- **Wind energy is available nationwide.** The Wind Vision Report shows that wind can be a viable source of renewable electricity in all 50 states by 2050.
- **Wind supports a strong domestic supply chain.** Wind has the potential to support over 600,000 jobs in manufacturing, installation, maintenance, and supporting services by 2050.
- **Wind is affordable.** As wind generation agreements typically provide 20 year fixed pricing, the electric utility sector is anticipated to be less sensitive to volatility in natural gas and coal fuel prices with more wind. By reducing national vulnerability to price spikes and supply disruptions with long-term pricing, wind is anticipated to save consumers $280 billion by 2050.
- **Wind reduces air pollution emissions.** Wind energy can help avoid the emission of over 250,000 metric tons of air pollutants, which include sulfur dioxide, nitric oxide, nitrogen dioxide, and particulate matter, as well as 12.3 gigatonnes of greenhouse gases by 2050.
- **Wind energy preserves water resources.** By 2050, wind energy can save 260 billion gallons of water—the equivalent to roughly 400,000 Olympic-size swimming pools—that would have been used by the electric power sector.
- **Wind deployment increases community revenues.** Local communities will be able to collect additional tax revenue from land lease payments and property taxes, reaching $3.2 billion annually by 2050.

Progress in the State RPS program through December 31, 2014 has yielded, and is expected to continue to yield, significant economic benefits to New York State and local communities. Economic benefits accrue from the planning, development, construction, and operation of renewable energy facilities. The Main Tier (large or utility scale) of the RPS is expected to generate $2.6 billion of direct economic investment in New York, at a benefit-cost ratio of $5-$1. This analysis also determined that for every 1 MWh of renewable energy generated under the RPS, approximately $27 is directly invested in New York State by RPS facilities (NYSERDA, 2015). The RPS has added approximately 650 jobs annually to New York's workforce. In addition, every dollar invested in New York energy resources remains in New York State, helping to reduce the dollars New Yorkers are currently sending out of state for economy-wide energy costs, estimated to be nearly $39 billion in 2012 (NYSERDA, 2014).

All of these economic and environmental benefits have occurred in New York with total RPS program costs expected to comprise less than 0.2% of total retail electricity expenditures, and perhaps more importantly, a cumulative net rate impact of essentially zero due to wholesale electricity price reductions resulting from the RPS program.

In addition to helping achieve the State and Federal goals described above, implementation of the proposed action will result in other socioeconomic, environmental, and human health benefits, each of which are briefly summarized below.

Socioeconomic Benefits

- Increased revenues to local municipalities, through PILOT and other agreements.
- Employment during the development phase. Where feasible, the Applicant has utilized locally based companies to undertake environmental field work, legal counsel, engineering assessments, etc.
- Short-term employment of construction workers and long-term employment of operations personnel.
- Direct lease payments to participating landowners, who are participating in the Project on a voluntary basis.
- "Direct economic effects" in the form of immediate payments to consultants, contractors, and the labor pool required to develop, build, and operate the Project.
- "Induced effects" in the form of everyday purchases made by the firms and employees working in the vicinity of Project Site (e.g., groceries, gas and supplies, hotel accommodations, patronization of local establishments, etc.).

Environmental Benefits

- Within the New York electricity market, wind-generated electricity typically displaces the use of fossil fuels in conventional power plants, producing a reduction in the emission of key air pollutants; sulfur dioxide and nitrogen oxides (acid rain precursors); mercury; and carbon dioxide (a contributor to global climate change). NYSERDA found that if wind energy supplied 10% (3,300 MW) of the state's peak electricity demand, 65% of the energy it displaced would come from natural gas, 15% from coal, and 10% from electricity imports. This equates to an annual displacement of 6,400 tons of nitrogen oxides and 12,000 tons of sulfur dioxide (GE Energy, 2005).

- Energy efficiencies and renewable generation together will reduce New York's greenhouse gas emissions, helping to achieve the State's CO2 reduction goals (NYSEPB, 2009, 2014).
- The well-being of some ecosystems in the northeastern U.S., including New York State, is at serious risk as a result of the negative environmental externalities associated with fossil fuel based power plant emissions. Research conducted by scientists from the Hubbard Brook Research Foundation concluded that "hotspots" throughout the Northeastern U.S. have levels of mercury deposition "10 to 20 times higher than pre-industrial conditions, and 4 to 5 times higher than current EPA estimates". This research highlights "the connection between airborne mercury emissions from United States sources and the existence of highly contaminated biological hotspots…Emission reductions from high-emitting sources near biological hotspots in the United States will yield beneficial improvements in both mercury deposition and mercury levels in fish and wildlife" (Driscoll et al., 2007).
- The Project will not require to use of water or water resources to generate electricity. Protection/conservation of surface and groundwater resources is a significant environmental concern and the development of electricity generation that is not reliant on water resources is extraordinarily important.

<u>Human Health Benefits</u>

- Airborne mercury, released primarily by coal-fired power plants, has contaminated numerous rivers, lakes, and streams across the State. While eating fish from State water bodies is not prohibited, the New York State Department of Health (NYSDOH) has issued advisories pertaining to fish consumption from certain waterbodies. Pregnant women, women who may become pregnant, or children under the age of 15 are advised not to consume any fish, at any time, from any of the listed waterbodies (NYSDOH, 2014).
- Sulfur dioxide and nitrogen oxide emissions react with volatile organic compounds in the atmosphere (i.e., gasoline vapors or solvents) and produce compounds that can result in severe lung damage, asthma, and emphysema (Wooley, 2000).
- Researchers at the Harvard School of Public Health estimated that air pollution from conventional energy sources across the U.S. kills between 50,000 and 70,000 Americans every year (Levy et al., 2000).
- Research undertaken by the American Cancer Society, Harvard School of Public Health, and the Environmental Protection Agency shows that residents in every single state across the Nation were at risk of premature death from air pollution (Cooper & Sovacool, 2007).

1.5 PROJECT FACILITY LAYOUT AND COMPONENTS

1.5.1 Facility Layout Criteria

The SEIS2 Project Layout was determined in accordance with the same criteria that were described in the DEIS and SEIS. These included wind resource assessment, setbacks, presence of sensitive environmental resources (such as wetlands and cultural resources), landowner preferences, and other issues raised during the public comment period. Equivalent studies and or analyses were performed for the SEIS2 in locations that were not previously reviewed during preparation of the DEIS and SEIS. These additional studies will be discussed in detail within the appropriate sections of the SEIS2 and, if applicable, are included as appendices.

1.5.2 Roads and Civil Construction Work

Approximately 12.4 miles of access roads will be constructed and/or improved to access the turbines, as compared with the 15.8 and 18 miles for the previous SEIS and DEIS layouts. Construction methods for the proposed access roads will be as described in the DEIS.

Project constructability has been evaluated through numerous on-site investigations, including in-field review and analysis of each turbine and access road location conducted by Project engineers and ecologists. The various activities that will occur as part of Project construction were detailed in Section 1.5 of the DEIS, and where necessary additional detail is provided below. Representative photographs of wind power project construction activities are included in Figure 4 of the DEIS, and typical construction details are included in Appendix A of the DEIS.

1.5.3 Turbine Tower Foundations

It is generally anticipated that turbine tower foundations will be constructed as described in Section 1.5.3 of the DEIS. However, as part or re-evaluating the Project subsequent to the DEIS, the Applicant has determined that blasting of near surface exposed rock and rock removal may be required in some instances. If bedrock is encountered it is anticipated to be ripable, and will be excavated with a backhoe. If the bedrock is not ripable, it will be excavated by pneumatic jacking, hydraulic fracturing, or blasting. If blasting is required, it will be conducted in compliance with a blasting plan (see SEIS2 Appendix A for the Preliminary Blasting Plan), and in accordance with all applicable regulations to avoid impacts to sensitive receptors (see Section 2.1.1.2.1 of this SEIS2 for additional information).

1.5.4 Wind Turbine Generators and Central Control System

As described in Section 1.1 of this SEIS2, the wind turbine generators that will ultimately be constructed for the Project have not been determined. However, the largest wind turbines presently being considered for the Project are the Vestas

V-110 wind turbines. For the purpose of presenting a conservative analysis, the assessment of potential environmental impacts throughout this SEIS2 assumes that the Project will use Vestas V-110 wind turbines.

Each wind turbine consists of three major mechanical components: the tower, nacelle, and rotor. Assuming use of the Vestas V-110 turbines, the anticipated tower height for the Project, or "hub height" (height from foundation to top of tower), is approximately 95 meters (312 feet). The V-110 has a rotor diameter of 110 meters (361 feet), resulting in a total height of 150 meters (492 feet). Additional information about each component is as follows:

Tower: The tubular towers used for this Project are anticipated to be conical steel structures manufactured in multiple sections. The towers have a base diameter of approximately 13.5 feet and a top diameter of approximately 10.4 feet. Each tower will have an access door, internal lighting, and an internal ladder to access the nacelle. The towers will be painted off-white to make the structure visible to aircraft (viewing against the ground) but decrease visibility against the sky.

Nacelle: The main mechanical components of the wind turbine are housed in the nacelle. These components include the drive train, gearbox, and generator. The nacelle is housed in a steel reinforced fiberglass shell that protects internal machinery from the environment and dampens noise emissions. The housing is designed to allow for adequate ventilation to cool internal machinery. The nacelle is equipped with an external anemometer and a wind vane that signals wind speed and direction information to an electronic controller. Attached to the top of the nacelle, per determinations of the Federal Aviation Administration (FAA), will be a single, medium intensity aviation warning light. These lights are anticipated to be flashing red strobes (L-864) and to operate only at night. The nacelle is mounted on a bearing that allows it to rotate ("yaw") into the wind to maximize energy capture.

Rotor: A rotor assembly is mounted to the nacelle to operate upwind of the tower. Each rotor consists of three composite blades that will be approximately 55 meters (180.4 feet) in length (total rotor diameter of 110 meters or (360.9 feet). The rotor swept area will be approximately 9,503 square meters (102,289 square feet). The rotor attaches to the drive train at the front of the nacelle. Hydraulic motors within the rotor hub feather each blade according to wind conditions, which enables the turbine to operate efficiently at varying wind speeds. Also, the rotor can spin at varying speeds to operate more efficiently at lower wind speeds. The Vestas V-110 begins generating energy at wind speeds as low as 3 meters per second (m/s) and will cut out when wind speeds reach 20 m/s. The maximum rotor speed is approximately 14.9 revolutions per minute (rpm).

1.5.5 Electrical Collection System Infrastructure

The network of buried electrical interconnects for the Project will generally be co-located with Project access roads (see Figure 2). Approximately 18 miles of underground power collection lines will be installed, with 9.5 miles of collection lines placed within the 12.4 miles of Project access road corridors. Buried collection lines located outside of access road corridors will comprise 8.5 miles of the total 18-mile collection system. Excavation and installation of the buried electrical interconnects will be conducted as described in the DEIS.

As described in Section 1.1.1, the DEIS and SEIS Project Layouts also included a 1.4-mile segment of overhead collection line in the southeastern portion of the Project. The 1.4-mile overhead collection line is no longer proposed as part of the Project. No overhead collection lines are proposed as part of the SEIS2 Project Layout.

1.5.6 Generator Lead

The Project will require an approximately 5.9-mile long overhead 34.55 kV generator lead line, which will deliver the Project's electricity to a POI substation located in the Town of Pomfret (see Figure 2). The generator lead will be built on up to 65 steel structures (or poles) that range in height from 58 to 120 feet. The currently proposed route of the overhead generator lead route is the result of consultation with area landowners to minimize impacts on current land uses, field investigations of sensitive natural resources (particularly wetlands, water resources, and cultural resources), field review with New York State Department of Agricultural and Markets (NYSDAM) personnel, and a field-based constructability review performed by the Applicant's engineering team.

1.5.7 Interconnect Substation

The proposed substation facility is located in the Town of Pomfret in the westernmost portion of the Project Site. Construction of the substation will require up to 2 acres of disturbance to existing vegetation and soils. The completed station (built facility) will total approximately 1.25 acres in size. The remaining 0.75 acre of disturbed vegetation and soils will be restored and revegetated with native vegetation. The 34.5 kV voltage power created by the wind farm will be increased to 115 kV at the substation and then connected to the existing, adjacent 115 kV electric transmission line. A more detailed site plan for the substation facility will be provided in the FEIS.

1.5.8 Meteorological Monitoring Station Towers

The SEIS2 Project Layout includes 1 permanent meteorological monitoring station tower, compared to the 4 proposed towers included in the SEIS Project Layout. This decrease is a result in the removal (in the SEIS2 Project Layout) of a string of turbines that were located in the southeast portion of the Project Site. The proposed meteorological tower location is shown on Figure 2. The area of temporary disturbance associated with the meteorological tower is approximately 1.0-acre and the area of permanent disturbance will be only approximately 0.1-acre.

1.5.9 Operations and Maintenance Facility

The physical description of the O&M facility is as provided in the DEIS. The facility, including an O&M building (approximately 8,000 square feet), adjacent space for vehicle parking and equipment storage is anticipated to disturb up to 2.0 acres. The proposed location of the facility in the SEIS2 Project Layout is shown in Figure 2.

1.6 PROJECT CONSTRUCTION

In general, Project construction information is as described in the DEIS, and where necessary additional detail is provided below. Project construction is anticipated to occur in a single phase, which is expected to begin in 2016 and be completed in 2017. Engineering evaluation and design has been initiated, including public road evaluations, civil design, foundation design, and electric system design (collection circuits and collector station/interconnection substation). The Project construction is anticipated to proceed as follows:

- Civil infrastructure work (e.g., public road improvements, access roads construction, turbine foundation construction) is anticipated to take place in the third and fourth quarters (Q3 and Q4) of 2016.
- Electrical engineering work (e.g., installation of buried interconnect and construction of the collection station/interconnection substation) is anticipated to take place from Q3 2016 to Q1 2017.
- Tower erection, nacelle installation, and rotor assembly/installation is anticipated to start in the summer of 2016 and be completed by July 2017.
- Project testing and commissioning is anticipated to start in July 2017 and be completed during August 2017.

Table 2 provides a revised preliminary construction schedule.

Table 2. Revised Preliminary Construction Schedule

Task	Duration (Weeks)	Anticipated Start Date
Preliminary Activities		
Reserve Turbines	-	Q4 2014
Order Substation Transformer	-	Q3 2015
Fabricate Turbines	30	Q1 2017

Fabricate Substation Transformer	50	Q3 2015
Grading of Substation Areas/POI Switchyard	6	July 2016
Construction		
Estimated Mobilization Date	1	May 2016
Environmental and Safety Training	1	June 2016
Road Construction	23	July 2016
Substation and Switchyard Construction	30	July 2016
Foundation Construction	23	July 2016
Electrical Collection System Construction	23	July 2016
Wind Turbine Assembly and Erection	13	May 2017
Switchyard and Substation Energization and Commissioning	4	March 2017
Energization and Commissioning of Turbines	10	July 2017
Final Grading	10	August 2017
Projected Substantial Completion Date	-	August 2017
Restoration Activities	10	August 2017

Table 3 provides the assumptions regarding the area of proposed vegetation clearing and soil disturbance impacts during construction and operation of the Project. These impact assumptions are conservative for the purpose of evaluating potential environmental impacts. The actual areas of vegetation clearing and soil impacts are anticipated to be less than the assumptions presented herein but will not be determined more precisely until Project engineering is complete.

Table 3. Revised Impact Assumptions and Calculations

Project Components	Typical Area of Vegetation Clearing	Area of Temporary Soil Disturbance	Area of Permanent Soil Disturbance
Wind Turbines and Workspaces	250’ radius per turbine	250’ radius per turbine	50’ radius per turbine and 65’ x 100’ crane pad
Access Roads	100’ wide per linear foot of new road	54’ wide per linear foot of road	34’ wide per linear foot of road
	50’ wide (adjacent to existing road)	50’ wide (adjacent to existing road)	50’ wide (adjacent to existing road)
Buried Electrical Interconnects	75’ wide per linear foot of cable	35’ wide per linear foot of cable	none

Project Components	Typical Area of Vegetation Clearing	Area of Temporary Soil Disturbance	Area of Permanent Soil Disturbance
Generator Lead	150' wide per linear foot of cable	12 feet wide temporary road within cleared area for construction access	Limited to pole footprint diameter
Permanent Meteorological Tower	1 acre	1 acre	0.1 acre
O&M Building	2 acres	2 acres	2 acres
Laydown Yard	0 acres	6.7 acres	none
Project Substation	2 acres	2 acres	1.25 acres

1.6.1 Laydown Yard/Construction Staging Area

The construction laydown yard/staging area will be developed as a temporary use area as described in the DEIS. In the SEIS2 Project Layout, the staging area will be located in an agricultural field adjacent to State Route 83. The staging area is no longer co-located with the proposed O&M facility (as described in the SEIS). The staging area has been expanded to 6.7 acres to accommodate the larger turbine components described within the SEIS2. No vegetation clearing will be requires for the laydown yard.

1.6.2 Access Road Installation

Access road installation is as described in the SEIS. The typical temporary impact width for new and existing roads during construction will be 54 feet. Typical permanent impact width for these roads will be 34 feet. Within agricultural areas, it is anticipated that permanent road widths will be reduced to 16 feet. Site-specific site conditions may result in either narrower or wider impact widths, based on the need to provide cut and fill of side slopes or to minimize impacts where sensitive resources occur. The final road design and layout will be determined during Project engineering but is not anticipated to exceed the general disturbance assumptions included herein.

1.7 OPERATIONS AND MAINTENANCE

In general, the operations and maintenance of the proposed facility is as described in the DEIS.

1.8 DECOMMISSIONING

In general, decommissioning and site restoration activities for the Project will be as described in the DEIS. However, the anticipated costs of decommissioning have been updated due to the amount of time that has passed since the DEIS was published. The Town of Arkwright Wind Law (Local Law No 2 of 2007), requires that this decommissioning estimate be reevaluated periodically for changes in costs of decommissioning and restoration as well as adjusted for inflation.

The DEIS presents estimated decommissioning costs for each wind turbine, which were prepared using available information from a variety of credible industry sources. As described in Table 1.8-1 of the DEIS, the estimated cost of decommissioning each wind turbine was estimated to be approximately $54,000 per turbine in 2007 dollars, taking into consideration the scrap value of the steel and generator components. The DEIS acknowledged that the actual cost of decommissioning is likely to be lower than this estimate, because the wind turbines are likely to have a salvage value in excess of their pure scrap value. As noted in the DEIS and SEIS and Exhibit 9 of the Project's 2008 Joint Permit Application for a Special Use Permit and Wind Overlay Zone, decommissioning costs were estimated using a variety of credible industry sources, the *Blue Book of Building and Construction,* current market prices, and current dollar value.

As detailed in Appendix B of this SEIS2 and Table 4, the estimated cost of decommissioning each wind turbine would be approximately $61,605 in 2014 dollars. In addition to the revised cost estimates, the depth to which turbine foundation concrete will be removed has been revised from 48 inches (as set forth in the 2008 Decommissioning Plan) to 36 inches (Table 4), which is the depth specified by the Town of Arkwright Local Law 2 of 2007, §657.

Table 4. Estimated Cost of Decommissioning per Wind Turbine.

Removal of Tower	270 man hours x $97.05/hour Cranes (2), 5 days x $6,850.59/day	$26,203.52 $34,252.95
Removal of Concrete to at Least 36 Inches Below Grade	150 man hours x $97.05 Equipment, 3 days x $2,854.41/day	$14,557.5 $8,563.23
Removal of Collection System	100 man hours x $97.05/hour Equipment, 2 days x$3,996.18/day	$9,705 $7,992.36
Seeding and Re-vegetation (Assumes 2 acres/turbine, including collection system)	3 man hours x $97.05/hour	$291.15
Total Removal Costs Per Turbine		**$101,556**
Scrap Value of Tower Steel	200 tons x $171.26/ton	$34,252
Scrap Value of Generator Components	Per turbine	$5,708.83

Total Salvage Value Per Turbine	**$39,961**
Estimated Per Turbine Net Cost of Decommissioning (Total Removal Cost Less Estimated Salvage Value)	**$61,605**

The funding mechanism to ensure decommission and site restoration funds will be as described in the DEIS and Exhibit 9 of the Project's 2008 Joint Permit Application for a Special Use Permit and Wind Overlay Zone.

1.9 PROJECT COST AND FUNDING

The current estimated capital cost to construct the Project ranges from $140 to $160 million dollars. The Applicant has committed to investing millions of dollars of at risk capital to option the land and associated wind rights of area landowners, as well as conduct initial Project feasibility studies. The Project will receive no public funding from the federal, state, or local governments during development or construction. The current federal production tax credit program expired on December 31, 2014. Arkwright Summit Wind is qualified for this production tax credit (the PTC) via the safe harbor rule, because it purchased many of the major project components, and by demonstrating continuous efforts toward construction. The project will receive tax credits worth $23 for each MWh it produces and delivers to the electrical grid for the first 10 years of its operation.

New York State's RPS creates a market for the green energy attributes of wind power that is separate from the market value of the underlying electricity. These attributes, referred to as renewable energy credits (RECs), are generated according to the number of MWh of power the Project produces. Arkwright Summit Wind Farm was awarded a contract for its RECs from the New York State Energy Research and Development Authority (NYSERDA) in the State's 9th Main Tier Solicitation. For the 164 MW of total renewables that were awarded contracts, the weighted average price of the all the RECs awarded in this contract was $22.96/REC.

Arkwright Summit Wind will monetize the electricity it produces by selling it into the wholesale power market operated by the New York Independent System Operator (NYISO). As an intermittent generator, the Project is also qualified to participate in the Capacity and Ancillary service markets for a portion of its nameplate capacity. For additional price certainty, the Applicant is seeking bilateral contracts for the electricity it produces with offtakers within the State of New York.

1.10 PERMITS AND APPROVALS REQUIRED

The permits and approvals described in Section 1.10 of the DEIS will still be required for the current Project. In addition, the Project also anticipates requiring the following approvals:

- An Amendment to the Town of Arkwright Zoning Ordinance Article VI-A Wind Energy Facilities (Local Law No. 2 of 2007) to allow for the construction of wind turbines taller than 420 feet in total height. This waiver is further discussed in Section 2.13 of this SEIS2.
- In the alternative, if the Town does not amend the local law, a variance for the height of the turbines.
- A Building Permit from the Town of Pomfret associated with the proposed POI substation.

1.11 PUBLIC AND AGENCY INVOLVEMENT

Public and agency involvement in the SEQRA review of the Project is as described in the DEIS and SEIS. Any additional agency consultation that has occurred since the publication of the DEIS and SEIS is included in Appendix C and/or included within the resource-specific assessment reports included as Appendices to this SEIS2. Public and agency comments on the DEIS and SEIS were reviewed by the Lead Agency and the Applicant and various follow-up investigations were conducted to address those comments. The filing of this SEIS2 will result in another public comment period and the combined consultation record from the DEIS, SEIS, and SEIS2 will be provided in the Project's FEIS, along with responses addressing those comments.

1.12 SEQRA PROCESS

As described in the DEIS and SEIS, the Town of Arkwright initiated review of the Project under SEQRA in 2008 based on the filing of the Special Use Permit Application under the Town's Zoning Law. In 2011, the New York State Legislature enacted Article 10 of the Public Service Law, which establishes a review process requiring the issuance of a Certificate of Environmental Compatibility and Public Need by the New York State Siting Board on Electric Generation and the Environment prior to the construction and operation of major electrical generating facilities (i.e., facilities with a generating capacity of 25 MW or more). However, PSL Section 162(4)(d) provides that Article 10 does not apply to Projects that have made an application to a local board in which the location of the major electric generating facility has been designated by the applicant. As discussed elsewhere in this SEIS2, the Project location is largely the same as the previously identified Project location described in both the DEIS and SEIS and the Special Use Permit Application. Therefore, based on the previous Special Use Permit application to the Town of Arkwright, which predates the enactment of Article 10, Arkwright Summit Wind Farm, is exempt from Article 10 and can proceed with the ongoing review before the Town Board.

The SEQRA process for the Project is described in the SEIS and repeated herein to clarify the sequence of the SEIS2 within the overall SEQRA review for the Project. In addition, the SEIS2 describes the subsequent steps necessary to conclude the SEQRA review.

The SEQRA process for the Arkwright Summit Wind Farm was initiated on January 10, 2008 with the submission of a Joint Permit Application for the Creation of Wind Overlay Zone and Special Use Permit to the Town of Arkwright. The Joint Application was prepared in accordance with Article VI-A of the Wind Energy Facilities Law (Local Law No. 2 of 2007) of the Town of Arkwright, New York. The Joint Application included a Full Environmental Assessment Form (EAF) Part 1, which was circulated to potential interested and involve agencies with a notification that the Town of Arkwright intended to serve as Lead Agency for the SEQRA review.

The Applicant prepared a DEIS, which was accepted as complete by the Lead Agency on February 27, 2008. The public comment period for the DEIS (typically, 30 days) was extended through May 30, 2008 and included a public hearing on April 30, 2008.

Following the submission of the DEIS, the Applicant proposed changes to the Project Layout that were considered material by the Lead Agency, resulting in the preparation of a SEIS. The SEIS was accepted as complete by the Lead Agency on April 13, 2009. The subsequent public comment period for the SEIS concluded on June 1, 2009.

As a result of the increase in turbine height, and the time that has passed since the public was last given an opportunity to comment on this Project, the Applicant has prepared this SEIS2. Following the acceptance of the SEIS2 by the Lead Agency, another 30-day public comment period will be conducted to provide the public and interested/involved agencies an opportunity to comment on the SEIS2. This SEIS2, along with a copy of the public notice, will be distributed for review and comment to the public, will be posted on the Applicant's website (http://www.edprwindfarms.com/farms/regulatory-permitting-information), and circulated to the agencies and parties that received copies of the DEIS and SEIS. In addition, the Lead Agency will schedule a public hearing, which will likely be held in conjunction with the application for wind energy permits, the proposed amended local law, the zoning change for the wind overlay, and any necessary waivers or variances.

Responses to comments on the DEIS, SEIS, and SEIS2 will be provided in the Project's Final Environmental Impact Statement (FEIS). The SEIS and SEIS2 provide much of the information requested by comments received on the DEIS and will be referenced in the FEIS comment responses as appropriate.

The remaining SEQRA process for the Project will include the following actions and anticipated time frames:

- SEIS2 accepted by Lead Agency (Town of Arkwright Town Board);
- File notice of completion of SEIS2 and notice of public comment period;
- 30-day public comment period;
- Applicant will provide updated Joint Application for a Special Use Permit and Wind Overlay Zone that addresses the changes in the Project since the original 2008 application.
- Public hearing on the SEIS2, updated Joint Application for a Special Use Permit and Wind Overlay Zone, amendment to the Local Law No. 2 of 2007, and any necessary waivers or variances;
- Respond to comments received on the DEIS, SEIS, and SEIS2 and prepare FEIS;
- FEIS accepted by Lead Agency;
- File notice of completion of FEIS;
- 10-day public consideration period;
- Lead Agency issue Findings Statement, completing the SEQRA process;
- Town acts on Pending Applications and Waivers; and
- Involved agencies issue Findings Statements.

1.12.1 Agency and Public Review

Agency and public review is as described in the DEIS. The SEIS2 will be available for agency and public review in a similar manner to the DEIS and SEIS review process and in accordance with the process established by the Lead Agency. The Applicant has also consulted with federal and state agencies and local municipalities in support of separate permitting processes required by the New York State Department of Environmental Conservation (NYSDEC), New York State Office of Parks, Recreation, and Historic Preservation (NYSOPRHP), the U.S. Army Corps of Engineers (USACE), and U.S. Fish and Wildlife Services (USFWS), as described in the DEIS and SEIS and in greater detail below in resource-specific assessments of potential environmental impacts.

2.0 ENVIRONMENTAL SETTING, IMPACT ANALYSIS, AND MITIGATION MEASURES

2.1 GEOGRAPHY, TOPOGRAPHY, AND SOILS

2.1.1 Geology and Topography

2.1.1.1 Existing Conditions

Topography

As described in the DEIS and SEIS, the Project Site is located in the Eastern Lake Section of the Central Lowland physiographic province (USGS, 2002). The topographic relief of the area is moderate, and the Project Site ranges from approximately 895 feet to 1,800 feet above mean sea level (amsl). A map showing the SEIS2 Project Layout over existing topography is provided in Figure 4 of this SEIS2.

Surficial Geology

The existing surficial geology within the Project vicinity is as described in Section 2.1.1.1 of the DEIS and SEIS, and Appendix B (Hydrogeologic Study) of the SEIS. The revisions to the Project layout for the SEIS2 have resulted in some changes to the description of existing conditions relative to surficial geology within the Project Site, as seen in Figure 5 of this SEIS2 and as described below.

Seven turbines have been removed from the Project (relative to the layout presented in the DEIS and SEIS) in the southeastern corner of the Project Site. As a consequence, Project facilities will no longer be located in in this area, which has surficial geology characterized by variable till and alluvial deposits. Additionally, the number of turbines that are located in the area of surficial bedrock in the northwestern portion of the Project Site has been reduced from four in the SEIS to three in the SEIS2.

Bedrock Geology

The bedrock geology within the Project vicinity is largely as described in Section 2.1.1.1 of the DEIS and SEIS, and Appendix B of the SEIS. The revisions to the Project layout for the SEIS2 have resulted in some changes to the description of existing conditions relative to bedrock geology within the Project Site, as seen in Figure 6 of this SEIS2 and as described below.

As stated above, seven turbines have been removed from the southeastern corner of the Project Site. Consequently, Project facilities will no longer be located in this area, which has bedrock geology characterized by Elicott Shale

(Conneaut Group) and Northeast Shale (Canadaway Group). As mentioned above, the current SEIS2 Project layout included three turbines that are located over surficial bedrock in the northeastern portion of the Project Site. This bedrock is comprised of Northeast Shale (Canadaway Group).

Fisher Associates prepared three separate geotechnical reports (Wind Turbines and Access Roads, Overhead Transmission, MET Tower), which are included in Appendix D of this SEIS2. These reports and associated investigations were prepared to determine the general subsurface conditions in those locations where the Project will be sited. With respect to sub-surficial geology, the subsurface borings at the wind turbine bearing grade (approximately 10 feet below the surface) generally encountered of either glacial drift, consisting of stiff to very stiff sandy clay, silty clay, or loose to medium dense silty sand, or glacial till, which generally consists of hard lean silty clay with gravel. These soils will generally provide adequate bearing assuming that they are not disturbed during excavation and are not allowed to saturate. With respect to bedrock geology, shale was occasionally encountered below the glacial drift or glacial till at the wind turbine locations. The shallowest depth at which shale was encountered was 10 feet, but more often it was encountered at depths greater than 20 feet. The shale was typically thinly bedded, with a fairly wide range in the degree of jointing and fracture. It appeared that the upper few feet of the shale was rippable at a minimum.

With respect to access roads, Fisher Associates indicates that heterogeneous near-surface soils that typically include a large percentage of silt exist in most locations. The silt is generally moisture-sensitive and can become unstable with an increase in moisture content. According to Fisher Associates, the proposed met tower location is characterized by approximately four inches of top soil consisting of very soft black sand with organic matter. This layer of top soil was generally underlain by a thin slackwater deposit of loose sandy silt approximately one foot in thickness, which in turn was underlain by stiff to hard glacial till extending from a depth of one foot to 29.4 feet below the ground surface.

Geologic Formations

The geologic formations in the Project vicinity are as described in the DEIS. The SEIS2 Project Site contains 61 natural gas wells (producing wells, non-commercial wells, and plugged and abandoned wells), as shown in Figure 7 of this SEIS2. However, consistent with the Project layouts presented in the DEIS and SEIS, all turbines in the SEIS2 Project layout have been sited in compliance with the 500 foot setback from gas wells required by Town of Arkwright Local Law No. 2, 2007.

As stated in the DEIS and SEIS, there are multiple sand and gravel/unconsolidated mining operations that occur within the vicinity of the Project. The revised SEIS2 Project site now includes two small sand and gravel mining operations that occur on participating parcels within the eastern portion of the Project Site. Additionally, as shown in Figure 7 of this SEIS2, there are three other sand and gravel mining operations that are located immediately adjacent to the Project Site.

Groundwater

As indicated in the DEIS, there is a mapped aquifer beneath the eastern portion of the Project vicinity, which is estimated to be 10 to 20 feet thick. For a detailed discussion on groundwater in relation to the Project, please see SEIS Appendix B, which provides a Project-specific hydrogeologic study. The study provided in SEIS Appendix B indicates that there are no sole-source or primary aquifers within the Project vicinity, and that available data suggests the Project vicinity contains modest to average groundwater availability.

Unusual Landforms

A discussion of unusual landforms in the Project vicinity is provided in the DEIS, which indicates that with the exception of Kame deposits and a glacial moraine feature, there are no additional unique landforms within the Project vicinity.

Geologic Hazards

A discussion of geologic hazards that pertain to the Project vicinity is provided in the DEIS. A map showing the faults that occur in Chautauqua County is provided in DEIS Figure 7: Chautauqua County Faults and SEIS Figure 2.1-5.

2.1.1.2 <u>Anticipated Impacts</u>

2.1.1.2.1 Construction

Anticipated impacts to geology and topography resulting from Project construction are as described in Section 2.1.1.2.1 of the DEIS and SEIS, except as noted below.

The Draft Geotechnical Investigation Report (see Appendix D of this SEIS2) indicates that it is unlikely that turbine foundations will be set into bedrock. The DEIS states that blasting is not anticipated to be necessary during Project construction, and in most instances this remains true. However, the Applicant has determined that blasting of near surface exposed rock and rock removal may be required for construction of the Project in some locations. Blasting may be necessary when bedrock is encountered at depths less than 10 feet below ground surface and in those instances when the bedrock is not rippable with an excavator or cannot be broken by pneumatic hammer. According to the geotechnical report, bedrock (shale) was encountered at a depth of exactly 10 feet at one of the potential turbine locations. While the report also stated that the upper few feet of shale bedrock is likely rippable, the results of the investigation suggest it is possible that blasting may be required in some locations. Blasted rock or boulders may be broken into a well graded mixture of the size recommended by the geotechnical engineer, and utilized in the nearest appropriate location (e.g., access roads).

Although not anticipated, in the event that blasting is necessary, the procedure shall consist of implementing line control to full depth and then the use of controlled blasting techniques in one or more benches to create minimum breakage outside the line control but create maximum rock fragmentation within the target area. There should be no significant blasting-related impacts on wells, foundations, etc., given that there are no permanent residences within 1,200 feet of proposed turbines. Consequently, potential impacts on the groundwater aquifer, water supply wells, and natural gas wells are not anticipated. Prior to blasting, the applicable regulatory concerns/requirements shall be met. The procedures that are anticipated to be implemented in association with any necessary blasting are summarized in SEIS2 Appendix A: Preliminary Blasting Plan.

Furthermore, the Project has been sited to avoid impacts to local mining operation and existing gas wells.

Other than the impacts described above, construction of the revised Project layout does not raise the potential for any new impacts with respect to geology and topography from what was previously reviewed and analyzed in the DEIS and SEIS.

2.1.1.2.2 Operation

There are no anticipated impacts to geologic resources resulting from Project operation.

2.1.1.3 <u>Proposed Mitigation</u>

A discussion of proposed mitigation measures for potential impacts to geologic resources resulting from Project construction and operation is presented in Section 2.1.1.3 of the DEIS.

As stated in Section 2.1.1.2.1, if blasting is found to be required, it will be conducted according to a site-specific blasting plan. A Preliminary Blasting Plan is appended to this SEIS2 (Appendix A). A Final Blasting Plan, as well as pre- and post-blasting surveys, will be prepared and conducted if blasting is required. Any necessary blasting will receive oversight by an environmental monitor. In addition, pre-notification signs and warnings to affected landowners, use of best management practices, and compliance with applicable permit requirements will be instituted as mitigation measures. Measures that are described in the Preliminary Blasting Plan (Appendix A) include:

A. The contractor or its subcontractor shall use sufficient stemming, matting or natural protective cover to prevent fly rock from leaving property owned or under control of the permittee or operator or from entering protected natural resources or natural buffer strips. Crushed rock or other suitable material must be used for stemming when available. Native gravel, drill cuttings or other material may be used for stemming if no other suitable material is available.

B. The maximum allowable air-blast at any inhabited building not owned or controlled by the developer may not exceed 128 decibels peak when measured by an instrument having a flat response (+ or - 3 decibels) over the range of 5 to 200 hertz.

C. The maximum allowable air-blast at an uninhabited building not owned or controlled by the developer may not exceed 128 decibels peak when measured by an instrument having a flat response (+ or - 3 decibels) over the range of 5 to 200 hertz. Depending on building use (or lack thereof), the allowable air-blast may increase to 140 decibels peak.

D. If a blast is to be initiated by detonating cord, the detonating cord must be covered by crushed rock or other suitable cover to reduce noise and concussion effects.

E. Prior to blasting at each site, a pre-blast survey will be conducted. The pre-blast survey will inspect the blast area, and adjacent areas. The survey will document existing conditions and will include, but not be limited to buildings/structures, water supply wells, utilities (above and below ground). The survey will include written documentation as well as photographic documentation of existing conditions.

F. Blasting may not occur in the period between sundown and sunrise of the following day or in the period from 7:00 p.m. to 7:00 a.m., whichever is greater.

G. A record of each blast, including seismographic data, must be kept for at least one year from the date of the last blast by the general contractor, its subcontractor (if appropriate) and the Applicant, and must be available for inspection during normal business hours. The blast record shall contain, at a minimum, the following data:

- Name of blasting company or blasting contractor;
- Location, date and time of blast;
- Name and signature of blaster;

- Type of material blasted;
- Number and spacing of holes and depth of burden or stemming;
- Diameter and depth of holes;
- Type of explosives used;
- Total amount of explosives used;
- Maximum amount of explosives used per delay period of 8 milliseconds or greater;
- Maximum number of holes per delay period of 8 milliseconds or greater;
- Method of firing and type of circuit;
- Direction and distance in feet to the nearest structure (both owned and not owned) by the project developer;
- Weather conditions, including such factors as wind direction and cloud cover;
- Height or length of stemming;
- Amount of mats or other protection used;
- Type of detonators used and delay periods used;
- The exact location of each geophone and the distance of each geophone from the blast;
- Seismographic readings, including peak particle velocity and frequency measured in the horizontal, vertical and longitudinal directions, and air-blast data;
- Name and signature of the person operating each seismograph;
- Names of the person and the firm analyzing the seismographic data, and
- The stratum or structure on which the geophone is located during each blast.

At the completion of basting, a post-blast survey will be conducted of the same facilities (structures, foundations, water supply wells, utilities, etc.) as documented during the pre-blast survey. Findings inconsistent with those reported during the pre-blast survey will immediately be provided to the contractor/subcontractor/Applicant, and will be documented in writing and photographs. Depending on the nature (and source) of the inconsistency, specific corrective actions will be developed in consultation with the affected party, and will set forth the method, procedures, and timing of implementation.

Furthermore, to ensure there are no impacts to existing utilities, the Project's construction contractor will contact Dig Safely New York to confirm the locations of buried gas lines and other utilities prior to the start of construction.

2.1.2 Soils

2.1.2.1 Existing Conditions

2.1.2.1.1 Soil Designations

A description of the four predominant general soil mapping units (associations), and the eight predominant soil series that are found within the Project vicinity is presented in Section 2.1.2.1.1 of the DEIS and SEIS. A map showing each soil map unit within the Project Site is provided in Figure 8 of this SEIS2. An updated soil impacts table is provided below in Section 2.1.2.2 of this SEIS2.

2.1.2.1.2 Prime Farmland

A discussion of prime farmland in relation to the Project is presented in Section 2.1.2.1.2 of the DEIS and SEIS. An updated soils impact table is provided below in Section 2.1.2.2 of this SEIS2.

2.1.2.1.3 Hydric Soils

A discussion of hydric soils that occur within the Project vicinity can be found in Section 2.1.2.1.3 of the DEIS. As listed in Table 7 (See SEIS2 Section 2.1.2.2.1 below), eight hydric soils occur within the Project Site. Further detail on hydric soils is presented in Section 2.2 (Water Resources) of this SEIS2, specifically in relation to on-site wetland delineations.

2.1.2.2 Anticipated Impacts to Soils

2.1.2.2.1 Construction

Soil Erosion and Siltation

A discussion of anticipated permanent and temporary impacts to soils resulting from Project construction and operation is presented in Section 2.1.2.2.1 of the DEIS and SEIS. Anticipated permanent and temporary impacts to soils have been updated based on the revised Project layout presented in this SEIS2 and are presented below by Project component in Table 5 and in Table 6 by soil type.

Table 5. Approximate Area of Soil Disturbance by Project Component

Component[1]	Acres Temporary Impact	Acres Permanent Impact
Turbines	155.8	15.2

Access Roads	30.1	51.1
Underground Collection System	76	0
Generator Lead Line	8.7	< 1
Substation	0.8	1.3
Laydown Yard	17.4	0
O&M Building	0	2
Total	**289.5**	**69.5**

1. 38 turbines including two alternate turbine locations and associated facilities proposed for the Project.

Table 6. Approximate Area of Soil Disturbance by Soil Type

Soil Code	Soil Name	Acres Temporary Impact	Acres Permanent Impact
Ad	Alden mucky silt loam	0.2	0.1
As	Ashville silt loam	4.8	1.6
BsA	Busti silt loam, 0 to 3 percent slopes	4.2	1.0
BsB	Busti silt loam, 3 to 8 percent slopes	86.9	17.1
BsC	Busti silt loam, 8 to 15 percent slopes	12.6	1.9
Cb	Canandaigua silt loam, loamy substratum	0.0	0.0
Ce	Carlisle muck	0.0	0.0
ChB	Chadakoin silt loam, 3 to 8 percent slopes	6.3	1.7
ChC	Chadakoin silt loam, 8 to 15 percent slopes	5.3	1.2
ChD	Chadakoin silt loam, 15 to 25 percent slopes	8.8	1.6
ChE	Chadakoin silt loam, 25 to 35 percent slopes	0.7	0.0
ChF	Chadakoin silt loam, 35 to 50 percent slopes	8.3	0.8
CkB	Chautauqua silt loam, 3 to 8 percent slopes	42.5	13.9
CkC	Chautauqua silt loam, 8 to 15 percent slopes	38.4	10.3
CkD	Chautauqua silt loam, 15 to 25 percent slopes	0.8	0.2
CnA	Chenango gravelly loam, 0 to 3 percent slopes	0.1	0.0
CnB	Chenango gravelly loam, 3 to 8 percent slopes	0.2	0.0
CnC	Chenango gravelly loam, 8 to 15 percent slopes	0.2	0.0
CoB	Chenango channery loam, fan, 3 to 8 percent slopes	0.5	0.0

Soil Code	Soil Name	Acres Temporary Impact	Acres Permanent Impact
CpB	Churchville silt loam, 3 to 8 percent slopes	0.0	0.0
CsB	Collamer silt loam, 3 to 8 percent slopes	0.1	0.0
CsC	Collamer silt loam, 8 to 15 percent slopes	0.0	0.0
DeA	Darien silt loam, 0 to 3 percent slopes	0.0	0.0
DeB	Darien silt loam, 3 to 8 percent slopes	0.1	0.0
DeC	Darien silt loam, 8 to 15 percent slopes	0.0	0.0
DkD	Dunkirk silt loam, 15 to 25 percent slopes	0.0	0.0
DkE	Dunkirk silt loam, 25 to 45 percent slopes	0.0	0.0
Fe	Fluvaquents-Udifluvents complex, frequently flooded	0.0	0.0
FmA	Fremont silt loam, 0 to 3 percent slopes	1.1	1.3
FmB	Fremont silt loam, 3 to 8 percent slopes	24.2	6.0
FmC	Fremont silt loam, 8 to 15 percent slopes	0.0	0.0
Ha	Halsey mucky silt loam	0.0	0.0
HrA	Hornell silt loam, 0 to 3 percent slopes	0.0	0.0
HrB	Hornell silt loam, 3 to 8 percent slopes	0.0	0.0
HrC	Hornell silt loam, 8 to 15 percent slopes	0.0	0.0
HrD	Hornell silt loam, 15 to 25 percent slopes	0.0	0.0
LnB	Langford silt loam, 3 to 8 percent slopes	0.0	0.0
LnC	Langford silt loam, 8 to 15 percent slopes	0.0	0.0
MdB	Mardin channery silt loam, 3 to 8 percent slopes	0.0	0.0
MdC	Mardin channery silt loam, 8 to 15 percent slopes	0.5	0.0
MdD	Mardin channery silt loam, 15 to 25 percent slopes	0.2	0.0
NgA	Niagara silt loam, 0 to 3 percent slopes, loamy substratum	0.2	0.0
Pa	Palms muck	0.0	0.0
Pg	Pits, gravel	0.0	0.0
Po	Pompton silt loam	0.0	0.0
Rh	Red Hook silt loam	0.0	0.0
ShB	Schuyler silt loam, 3 to 8 percent slopes	0.0	0.0
ShC	Schuyler silt loam, 8 to 15 percent slopes	9.7	1.7
ShD	Schuyler silt loam, 15 to 25 percent slopes	0.0	0.0

Soil Code	Soil Name	Acres Temporary Impact	Acres Permanent Impact
ShE	Schuyler silt loam, 25 to 35 percent slopes	0.3	0.2
ShF	Schuyler silt loam, 35 to 50 percent slopes	0.0	0.0
ToC	Towerville silt loam, 8 to 15 percent slopes	0.0	0.0
ToE	Towerville silt loam, 25 to 35 percent slopes	0.0	0.0
ToF	Towerville silt loam, 35 to 50 percent slopes	0.0	0.0
VaB	Valois gravelly silt loam, 3 to 8 percent slopes	2.8	1.1
VaC	Valois gravelly silt loam, 8 to 15 percent slopes	11.0	2.9
VaD	Valois gravelly silt loam, 15 to 25 percent slopes	0.1	0.0
VaE	Valois gravelly silt loam, 25 to 35 percent slopes	0.0	0.0
VaF	Valois gravelly silt loam, 35 to 50 percent slopes	0.1	0.0
VcC	Valois gravelly silt loam, rolling	17.4	5.0
VoB	Volusia channery silt loam, 3 to 8 percent slopes	0.0	0.0
Wy	Wayland silt loam	0.0	0.0

Hydric Soils

Anticipated impacts to hydric soils resulting from Project construction and operation are presented in Table 7 below.

Table 7. Impacts to Hydric Soils

Soil Symbol	Soil Name	Acres Temporary Impact	Acres Permanent Impact
Ad	Alden mucky silt loam	0.2	0.1
As	Ashville silt loam	4.8	1.6
Cb	Canandaigua silt loam, loamy substratum	0.0	0.0
Ce	Carlisle muck	0.0	0.0
Ha	Halsey mucky silt loam	0.0	0.0
Pa	Palms muck	0.0	0.0
Wy	Wayland silt loam	0.0	0.0
Fe	Fluvaquents-Udifluvents complex, frequently flooded	0.0	0.0
	Total	**5.0**	**1.7**

Farmland Soils

Information regarding anticipated impacts of construction to farmland soils are largely as described in the DEIS and SEIS, with some changes to the temporary and permanent acres of impact due to the SEIS2 Project layout revisions. The updated Table 8, Impacts to Farmland Soils, indicates that based on the current proposed layout and GIS mapping, construction of the Project would temporarily impact approximately 145.0 acres of Prime Farmland Soils and Prime Farmland Soils-When Drained. After restoration, the area of impact will be reduced to approximately 36.1 acres of Prime Farmland Soils and Prime Farmland Soils-When Drained permanently affected by the Project. It is worth noting that these areas are not necessarily used for active agricultural purposes; rather, based on their physical and chemical properties, they are simply characterized as very high quality soils that can consistently produce sustained high crop yields when treated and managed using acceptable farming methods. Refer to Section 2.3.2 of this SEIS2 for estimated temporary and permanent impacts to actual areas of cultivated crops.

Table 8. Impacts to Farmland Soils

Prime Farmland Soils	Soil Name	Acres Temporary Impact	Acres Permanent Impact
ChB	Chadakoin silt loam, 3 to 8 percent slopes	6.3	1.7
CkB	Chautauqua silt loam, 3 to 8 percent slopes	42.5	13.9
can	Chenango gravelly loam, 0 to 3 percent slopes	0.1	0.0
CnB	Chenango gravelly loam, 3 to 8 percent slopes	0.2	0.0
CoB	Chenango channery loam, fan, 3 to 8 percent slopes	0.5	0.0
CsB	Collamer silt loam, 3 to 8 percent slopes	0.1	0.0
Po	Pompton silt loam	0.0	0.0
ShB	Schuyler silt loam, 3 to 8 percent slopes	0.0	0.0
VaB	Valois gravelly silt loam, 3 to 8 percent slopes	2.8	1.1
	Total	**52.5**	**16.7**
Prime Farmland When Drained			
BsA	Busti silt loam, 0 to 3 percent slopes	4.2	1.0
BsB	Busti silt loam, 3 to 8 percent slopes	86.9	17.1
CpB	Churchville silt loam, 3 to 8 percent slopes	0.0	0.0
DeA	Darien silt loam, 0 to 3 percent slopes	0.0	0.0

DeB	Darien silt loam, 3 to 8 percent slopes	0.1	0.0
FmA	Fremont silt loam, 0 to 3 percent slopes	1.1	1.3
HrA	Hornell silt loam, 0 to 3 percent slopes	0.0	0.0
NgA	Niagara silt loam, 0 to 3 percent slopes, loamy substratum	0.2	0.0
Rh	Red Hook silt loam	0.0	0.0
	Total	**92.5**	**19.4**
Farmland of Statewide Importance			
As	Ashville silt loam	4.8	1.6
BsC	Busti silt loam, 8 to 15 percent slopes	12.6	1.9
Cb	Canandaigua silt loam, loamy substratum	0.0	0.0
ChC	Chadakoin silt loam, 8 to 15 percent slopes	5.3	1.2
CkC	Chautauqua silt loam, 8 to 15 percent slopes	38.4	10.3
CnC	Chenango gravelly loam, 8 to 15 percent slopes	0.2	0.0
CsC	Collamer silt loam, 8 to 15 percent slopes	0.0	0.0
DeC	Darien silt loam, 8 to 15 percent slopes	0.0	0.0
FmB	Fremont silt loam, 3 to 8 percent slopes	24.2	6.0
FmC	Fremont silt loam, 8 to 15 percent slopes	0.0	0.0
HrB	Hornell silt loam, 3 to 8 percent slopes	0.0	0.0
HrC	Hornell silt loam, 8 to 15 percent slopes	0.0	0.0
LnB	Langford silt loam, 3 to 8 percent slopes	0.0	0.0
LnC	Langford silt loam, 8 to 15 percent slopes	0.0	0.0
MdB	Mardin channery silt loam, 3 to 8 percent slopes	0.0	0.0
MdC	Mardin channery silt loam, 8 to 15 percent slopes	0.5	0.0
ShC	Schuyler silt loam, 8 to 15 percent slopes	9.7	1.7
ToC	Towerville silt loam, 8 to 15 percent slopes	0.0	0.0
VaC	Valois gravelly silt loam, 8 to 15 percent slopes	11.0	2.9
VcC	Valois gravelly silt loam, rolling	17.4	5.0

VoB	Volusia channery silt loam, 3 to 8 percent slopes	0.0	0.0
	Total	**124.2**	**30.6**

In addition, on June 17, 2015 a review of the Project layout was conducted by Michael Saviola of the NYS Department of Agriculture and Markets (NYSDAM) and Ben Brazell of EDR. The purpose of this site visit was to review the proposed Project layout in the context of agricultural operations. Mr. Saviola suggested minor revisions to the location of the proposed substation, segments of three access roads, and two segments of the route of the proposed Generator Lead Line. The Applicant reviewed these suggested changes relative to identified environmental resources (e.g., wetlands), with the participating landowners, and with their Project engineer. The Applicant incorporated those recommendations requested by NYSDAM that were acceptable to landowners and/or that did not conflict with the locations of wetlands or other potential environmental impacts.

Liquid Spills

Information regarding anticipated impacts to soils resulting from liquid spills is as presented in Section 2.1.2.2.1 of the DEIS.

2.1.2.2.2 Operation

A discussion of anticipated potential impacts to soils resulting from Project operation is presented in Section 2.1.2.2.2 of the DEIS. The potential for post-construction impacts to soils from the operation of the Project is largely limited to temporary disturbances during maintenance and repair activities. However, these disturbances are expected to be minimal because the majority of maintenance and repair activities will utilize the infrastructure established during construction (e.g. crane pads, access roads).

2.1.2.3 Proposed Mitigation

2.1.2.3.1 Temporary Mitigation Measures

A discussion of proposed mitigation for potential temporary impacts to soils is provided in Section 2.1.2.3.1 of the DEIS. During construction, a qualified Agricultural inspector will be present during construction restoration activities that take place on agricultural land. The Project will also obtain coverage under a State Pollution Discharge Elimination System (SPDES) general permit. All work will be conducted in strict compliance with the provisions of the permit. For a detailed discussion of the proposed mitigation measures and associated best management practices, please see Section 2.1.2.3.1 of the DEIS.

2.1.2.3.2 Permanent Mitigation Measures

To the maximum extent practicable, the Project has been designed in accordance with the New York State Agriculture & Markets Guidelines for Agricultural Mitigation for Windpower Projects (NYSA&M, 2013; see Appendix R). For example, the Applicant has utilized existing public and private roads (such as farm, gas well, and logging roads) when siting Project facilities wherever practicable. Furthermore, buried collection lines will be installed at depths and in locations that provide for long-term agricultural use above them. Roads and turbines have also been aligned at the edges of fields where possible to avoid impacting agricultural operations.

Proposed permanent measures to avoid, minimize, and mitigate impacts to soils are also as described in Section 2.1.2.3.2 of the DEIS and SEIS.

2.2 WATER RESOURCES

2.2.1 Existing Conditions

The discussion of existing water resource conditions in the Project Site provided in Section 2.2.1 of the DEIS remains generally accurate. The Project lies within two watersheds, the Chautauqua-Conneaut drainage basin (USGS Hydrologic Unit 04120101) and the Conewango drainage basin (USGS hydrologic unit 05010002). The majority of the Project Site lies within the Chautauqua-Conneaut drainage basin, with the southeastern portion of the Project Site occurring within the Conewango drainage basin.

2.2.1.1 Surface Waters

A discussion of existing surface water conditions within the vicinity of the Project is provided in Section 2.2.1.1 of the DEIS and remains largely accurate. Surface waters account for 98 percent of recorded water use in Chautauqua County (USGS 2010). These waters are used for public water supply systems, industrial purposes, and thermoelectric purpose. When combined, these uses average 106.7 million gallons per day.

Table 9. Year 2010 Water Usage in Chautauqua County, New York, as Reported by USGS

Type of Use	Surface Water (Million Gallons per Day)	Ground Water (Million Gallons per Day)
Public Supply	8.87	5.68
Domestic	0	1.98
Industrial	0	0.5
Thermoelectric	418.1	0

Source: USGS National Water Information System 2015

Database searches of NYSDEC Wild, Scenic, and Recreational Rivers confirmed the DEIS finding that none of these types of rivers occur within the Project Site (NYSDEC, 2015b). However, there are streams within the Project Site protected on the basis of their classification pursuant to 6 NYCRR Part 608 Protection of Waters. Streams are assigned a class based on their best use, with classes A and AA ideal for drinking water, class B ideal for swimming and other contact recreation, class C supporting fisheries, and class D, the lowest class, not suitable for any of the above uses. Additionally, the standard (T) identifies the stream as a trout fishery and the standard (TS) identifies a stream as supporting trout spawning. Protected streams (those that are considered jurisdictional by NYSDEC) are classes C(T) and C(TS) and above. Classes C and D are not protected by NYSDEC. Protected streams that run through the Project Site include classes AA, B, B(TS), and C(T). All unprotected streams that flow through the Project Site are class C or D. There are also several small streams within the Project Site that were identified during the Wetland and Stream Delineation Study that are not mapped or classified by the NYSDEC (see Section 2.2.1.2 of this SEIS2 for additional information regarding the Wetland and Stream Delineation Study and Appendix E of this SEIS2).

Protected Streams, pursuant to 6 NYCRR Part 608, within the Project Site include Canadaway Creek, Clinton Brook, Walnut Creek, and several of these streams' tributaries. These streams and other surface waterbodies in the Project Site are listed in Table 10 and shown in Figure 9 of this SEIS2: Mapped Streams and Wetlands.

Table 10. Surface Waters within the Project Site

Stream Name	NYSDEC Class	Linear Feet Within Project Site
West Branch Conewango Creek (trib)	C	9,735
West Branch Conewango Creek (trib)	C	4,578
West Branch Conewango Creek (trib)	C	4,357

West Branch Conewango Creek (trib)	C	1,218
West Branch Conewango Creek (trib)	C	1,344
Walnut Creek (trib)	C	1,959
Walnut Creek	C	193
Walnut Creek	AA	5,251
Walnut Creek (trib)	AA	1,723
Walnut Creek (trib)	C(T)	5,627
Walnut Creek (trib)	C(T)	12,784
Walnut Creek (trib)	C(T)	322
Walnut Creek (trib)	C(T)	729
Walnut Creek (trib)	C	8,590
Walnut Creek (trib)	C	3,908
Walnut Creek (trib)	C	198
Canadaway Creek	C	2,849
Canadaway Creek (trib)	B	20,637
Clinton Brook	C(T)	9,169
Canadaway Creek (trib)	C(T)	4,021
Scott Creek (trib)	C	570

2.2.1.2 Wetlands

A general discussion of existing wetland conditions within the Project vicinity is provided in Section 2.2.1.2 of the DEIS. About 25.8 acres or 0.06% of the land area within the Project Site is represented by wetlands mapped by the National Wetland Inventory (NWI) (Figure 9: Mapped Wetlands and Streams). There are no mapped NYSDEC-regulated wetlands within the Project Site. There are a total of 33 NWI wetlands mapped within the Project Site. By area, the majority of these are forested wetlands, which cover about 17.5 acres or 68% of the NWI wetlands that occur on the Project Site. A summary of the NWI mapped wetlands is provided below in Table 11.

Table 11. NWI Mapped Wetlands within the Project Site

Mapped Wetland	Cover Type	Area within Project Site (acres)

NWI	Forested and Scrub/Shrub	17.5
NWI	Emergent	1.7
NWI	Pond	6.6

The presence of wetlands and streams within the Project Site was originally assessed during reconnaissance-level field observations and on-site wetland delineations conducted by Tetra Tech in October and November of 2007, the results of which were included in the DEIS. Subsequently, a Wetlands and Waterbodies Report was prepared and included in Appendix C of the SEIS. This report presented the results of a field-based wetland delineation effort conducted during the summer and fall of 2008 and spring of 2009 by Ecology and Environment, Inc. (E & E). Information about the functions and value of each wetland delineated in 2008 and 2009 is included in Table 5-2 of Appendix C of the SEIS. Modification of the proposed project layout in 2012 and 2013 resulted in the collection of additional wetland delineations in the fall of 2012 and the spring of 2013. A jurisdictional determination application containing this information was never filed, as the Project was subsequently put on hold.

2.2.1.2.1 2015 Wetland Delineations

An additional field based wetland delineation of the Project Site and the locations of proposed Project facilities was conducted by E & E during the summer of 2015 (see Appendix E of this SEIS2). Results of the wetland delineations were shared with the USACE and NYSDEC in September 2015 (see Appendix C of this SEIS2). In general, surveys conducted for wetland and waterbody resources were contained within a 250-foot-wide corridor centered on access roads and the transmission line, a 100-foot-wide corridor centered on associated electric collection lines connecting the individual turbines, a laydown area, an interconnect facility, and a circular area with a 250-foot radius surrounding each turbine. These delineations included a reevaluation of the wetlands delineated during the 2008 to 2009 field surveys and verification/reevaluation of the wetlands delineated during the 2012 and 2013 field surveys. The results of the 2015 wetland delineation are discussed below and shown in Figure 10 of this SEIS2.

2.2.1.2.2 Wetland Delineation Procedure

During the 2015 field surveys, the field teams used established wetland delineation procedures as outlined in the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region* (USACE 2012) for both the routine and problematic methods for onsite inspections. The specific procedures used to evaluate the soils, vegetation, and hydrology at each potential wetland location is described below.

Soils

During the 2015 wetland surveys, soils were examined by using a tile spade shovel, or "sharpshooter," to a depth needed to document a hydric soil indicator or to confirm the absence of indicators. The typical depth of the soil pits was 16 inches unless the investigators reached restrictive layers such as cobbles at a shallower depth. Soil colors were identified using a Munsell Soil Color Chart (Munsell 2009). Other characteristics such as the presence of redox features, soil texture, or other hydric indicators such as a hydrogen sulfide odor were recorded on the datasheet for each soil layer. Once the soil profile was documented, any of the 19 applicable regional hydric soil indicator(s) were selected where the criteria were met. The soil was considered hydric if any of the applicable regional indicators were present.

Hydrology

In general, the criteria for wetland hydrology are met if the area is inundated or saturated within 12 inches (30 cm) of the soil surface during the growing season for a time sufficient to develop hydric soils and support hydrophytic vegetation. In the absence of hydrologic data, it was often necessary to use field characteristics to identify wetland hydrology. Primary indicators used during the 2015 surveys included, but are not limited to: surface water, high water table, saturation, water marks, sediment deposits, drift deposits, algal mat or crusts, iron deposits, inundation visible on aerial imagery, sparsely vegetated concave surface, water-stained leaves, aquatic fauna, marl deposits, hydrogen sulfide odor, oxidized rhizospheres on living roots, presence of reduced iron, recent iron reduction in tilled soils, or thin muck surface. Secondary indicators included, but are not limited to: surface soil cracks, drainage patterns, moss trim lines, dry-season water table, crayfish burrows, saturation visible on aerial imagery, stunted or stressed plants, geomorphic condition, shallow aquitard, microtopographic relief, or the FAC-neutral test. All applicable hydrology indicators, as well as the depth of surface water, depth to free water in the soil pit, and depth to soil saturation, were recorded for each wetland area. In general, hydrology criteria are met if one primary or two secondary indicators are present.

Vegetation

During the 2015 surveys, the species present in each major vegetative stratum (i.e., tree, sapling/shrub, herbaceous, and woody vine) were identified and recorded. Typically, species in the herbaceous strata were documented within five feet (1.5 m), the sapling/shrub strata were documented within 15 feet (4.6 m), and trees and woody vines stratum were documented within 30 feet (9.1 m) of the soil pit. Each plant was then described using a wetland indicator status (i.e., obligate wetland (OBL), facultative wetland (FACW), facultative (FAC), facultative upland (FACU), or upland (UPL)) from The National Plant List (Lichvar 2014). Absolute percent cover for each species was visually estimated and recorded. Species dominance was determined by applying the 50/20 rule in each stratum. Hydrophytic vegetation was considered present if the indicators described in the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region* (USACE 2012) were met.

Wetland Boundaries

During the 2015 surveys, if the soils, hydrology, and vegetation indicators at a survey point were present, the boundary of the wetland was determined, and it was flagged with wetland delineation tape. The approximate boundary was recorded on site maps, and the flagged boundary was surveyed using a Trimble Geo6000™ global positioning system (GPS) unit. Wetland flagging tape was not used in agricultural fields or pastures where only GPS points were taken. Photographs were taken at each delineated wetland within the survey corridor, or limit of jurisdictional determination (LoJD). Wetland and upland data points were documented by using the Wetland Determination Data Form – Northcentral and Northeast Region from the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region* (USACE 2012). GPS points were taken at all datasheet and photo locations.

2.2.1.2.3 Streams, Ponds, and Ditches Delineation Procedure

In addition to wetlands, E&E field teams delineated hydrologic features such as stream channels and unvegetated ponds, by identifying their ordinary high water mark (OHWM). Guidance from the USACE indicates that the following characteristics should be considered when making an OHWM determination, to the extent that they can be identified and are deemed reasonably reliable (USACE 2007):

- Natural line impressed on the bank
- Shelving
- Changes in the character of soil
- Destruction of terrestrial vegetation
- Presence of litter and debris

- Wracking
- Vegetation matted down, bent, or absent
- Sediment sorting
- Leaf litter disturbed or washed away
- Scour
- Deposition
- Multiple observed flow events
- Bed and banks
- Water staining
- Change in plant community

Waterways that showed evidence of water scour and exhibited defined banks and channels were designated as streams. Intermittent and ephemeral streams were identified as waterways having little or no flow during the survey dry periods, but as having the potential to have high flow during and after a heavy rain event. When the water is not flowing, it may remain in isolated pools or surface water may be absent. Perennial streams and waterways have some flow throughout the year. Drainages and ditches were identified as areas that convey water through a man-made ditch design (e.g., roadside ditch), but they do not have a discernable bed/bank or OHWM. In some cases, the drainage/ditch feature class was used for natural drainage ways and swales that did not meet the definition of a stream (lacking a bed/bank) or wetland. A Stream Data Sheet was not completed for ditch/drain features, and only locational information (GPS) was compiled. Stream Data Sheets were only completed for stream features.

2.2.1.2.4 Summary of Wetland Community Types

Several wetland community types exist within the survey corridor, or Limit of Jurisdictional Determination (LoJD), at the Arkwright Summit Wind Farm. During field surveys, wetland community type was recorded using the Cowardin classification system (Cowardin et al. 1979). The classification assigned to each wetland at the time of the field surveys is included in Appendix A of the Wetland Delineation Report (Appendix E of this SEIS2). In order to provide a better assessment of wetland habitat within the LoJD, the survey information was reviewed subsequent to the completion of field work, and descriptions of the wetland communities were written based on the classification system presented in Edinger et al. (2014). Based on field observations and the classification system presented in Edinger et al., six general palustrine and lacustrine wetland communities were identified in the LoJD: deep emergent marsh, shallow emergent marsh, scrub-shrub swamps, red maple-hardwood swamp, hemlock-hardwood swamp, and artificial ponds. A detailed description of vegetation associated with each community type, as observed during field surveys, is provided below. These descriptions are listed under the four Cowardin classification types used during field surveys for each wetland unit delineated.

Palustrine Emergent Wetland (PEM)

Wetlands classified under the Cowardin system as palustrine emergent wetlands (PEM) are dominated by herbaceous vegetation with little or no woody plant material present (Cowardin et al. 1979). These are further described using the classification system presented in Edinger et al. (2014) as either Deep Emergent Marshes or Shallow Emergent Marshes.

<u>Deep Emergent Marshes</u>

Description: According to Edinger et al. (2014), these marshes occur on mineral soil or fine-grained organic soils and have less than 50 percent canopy cover. These marshes have standing water that fluctuates seasonally but is persistent with substrate that is almost always inundated.

Distribution: Deep emergent marshes with persistent inundation were scattered throughout the LoJD. These wetlands are listed as PEM in the delineated wetland summary table (Table 5-4) of Appendix E.

Vegetation:

- Overstory: Trees found in surrounding forest communities sometimes occur around the perimeter of the wetland but are not included in the deep emergent marsh component of these wetlands. None of the deep emergent marshes delineated was surrounded by trees.
- Understory/Shrub Layer: Hydrophytic understory or shrub species that were found to occur around the perimeter of the delineated deep emergent wetlands include American elm (*Ulmus americana*), green ash (*Fraxinus pennsylvanica*), northern arrowwood (*Viburnum recognitum*) and willow species (*Salix* spp.).
- Herbaceous Layer: Emergent hydrophytes found in deep emergent marshes included jewelweed (*Impatiens capensis*), larger blue flag (*Iris versicolor*), sedges (*Carex* spp.), rice cutgrass (*Leersia oryzoides*), spikerush (*Eleocharis* spp.), duckweed (*Lemna valdiviana*), reed canary grass (*Phalaris arundinacea*), and cattail (*Typha spp.*).

Shallow Emergent Marshes

Description: These marshes have less than 50 percent cover and occur on saturated mineral soils or deep muck soils. They are rarely inundated, but almost always saturated, and are more well drained than deep emergent marshes. Standing water may disappear completely after the wet season.

Distribution: Shallow emergent marshes occur throughout the LoJD in successional fields and in openings in forested areas. Wetlands listed as PEM in Table 5-4 of Appendix E are shallow emergent marshes unless there is an indication of persistent or permanent inundation.

Vegetation:

- Overstory: Tree species may occur around the perimeter of the wetland but do not occur within the wetland boundary.
- Understory/Shrub Layer: If present, shrubs or saplings occur in isolated patches or individuals and include northern arrowwood, meadow-sweet (*Spiraea latifolia*), and willow.
- Herbaceous Layer: Herbaceous species in these wetlands vary throughout the LoJD with the following species commonly appearing as dominants or co-dominants: sensitive fern (*Onoclea sensibilis*), jewelweed, rough stemmed goldenrod (*Solidago rugosa*), soft rush (*Juncus effusus*), sedges, giant goldenrod (*Solidago gigantea*), false hellebore (*Veratrum viride*), woolgrass (*Scirpus cyperinus*), horsetail (*Equesitum* spp.), cinnamon fern (*Osmunda cinnamomea*) and mannagrasses (*Glyceria sp.).*

Palustrine Scrub-Shrub Wetland (PSS)

Palustrine scrub-shrub wetlands (PSS) are dominated by woody vegetation (i.e., trees or shrubs) less than 6 meters (20 feet) tall. Wetlands classified under the Cowardin system as PSS wetlands are further described using the classification system presented in Edinger et al. (2014) as scrub-shrub swamps.

Scrub-shrub Swamps

Description: These wetlands occur on mineral soil or muck and are variable in structure and distribution. They can be found near ponds and/or stream sides, in transitional areas between forest and open land, and in isolated depressional areas.

Distribution: Scrub shrub wetlands are found intermittently in the LoJD as portions of larger wetlands that typically also have an emergent or forested component.

Vegetation:

- Overstory: Tree species may occur around the perimeter of the wetland but do not occur within the boundary of a scrub-shrub wetland.
- Understory/Shrub Layers: The shrub species found in the LoJD as dominants or co-dominants include northern arrowwood, willow, spicebush (*Lindera benzoin*), red osier dogwood (*Cornus sericea*), and meadow-sweet.
- Herbaceous Layers: Herbaceous and emergent species are less dominant than shrub species and include mannagrasses, soft rush, rice cutgrass, and rough stemmed goldenrod.

Palustrine Forested Wetland (PFO)

Within the Project Area, palustrine forested wetlands (PFO) are dominated by deciduous tree species, which lose their leaves during the cold season or by a mix of broad-leaved deciduous and needle-leaved evergreen trees. These are further described using the classification system presented in Edinger et al. (2014) as either red maple-hardwood swamps or hemlock-hardwood swamps.

<u>Red Maple-hardwood Swamps</u>

Description: This is a hardwood swamp that occurs in poorly drained depressions, normally underlain by inorganic soils. Red maple is either dominant or co-dominant in these swamps in the LoJD.

Distribution: Most forested wetland communities found within the LoJD are red maple-hardwood swamps. These communities occur in beech-maple, successional northern hardwood forests throughout the LoJD. PFO wetlands in Table 5-4 of Appendix E are red maple-hardwood swamps unless there is a comment indicating that they are dominated by hemlock.

Vegetation:

- Overstory: Red maple (*Acer rubrum*) is usually the dominant species. Other co-dominants and common overstory trees include green ash and American elm.
- Understory/Shrub Layers: The shrub layer, when present, is dominated by saplings of overstory species, northern arrowwood and willow.
- Herbaceous Layers: Dominant species include jewelweed, sensitive fern, and fringe sedge. Other common species include false hellebore, mannagrasses, and other sedges (*Carex* spp.).

<u>Hemlock-Hardwood Swamp</u>

Description: These closed canopy swamps occur on mineral soils and deep muck in depressions within hemlock-northern hardwood forests. Species diversity is usually poor with few shrub and herbaceous species growing beneath the canopy.

Distribution: Hemlock-hardwood swamps were observed within hemlock northern hardwood communities in the LoJD. These wetlands occurred in depressions and hummocky areas in higher elevations.

Vegetation:

- Overstory: Eastern hemlock (*Tsuga canadensis*) is the dominant species in these wetlands. Common species include yellow birch (*Betula alleghaniensis*) and red maple.
- Understory/Shrub Layers: The understory is composed primarily of saplings of overstory trees, spicebush, and musclewood (*Carpinus caroliniana*).
- Herbaceous Layers: Skunk cabbage (*Symplocarpus foetidus*) and sensitive fern are typical dominants. Cinnamon fern (*Osmunda cinnamomea*) was also common in canopy openings.

Artificial Ponds (POW)

Wetlands classified under the Cowardin system as palustrine open water (POW) are included in the artificial pond classification presented in Edinger et al. (2014).

Description: These man-made ponds are constructed in farm fields, residential areas, or recreational properties for agricultural, recreational, or aesthetic purposes. They could potentially be stocked with fish and contain little or no aquatic vegetation.

Distribution: Artificial ponds occur intermittently within the LoJD.

Vegetation:

- Overstory: There is no overstory vegetation.
- Understory/Shrub Layers: There is no understory/shrub vegetation.
- Herbaceous Layers: Many of these ponds were stocked with aquatic plants, and were frequently ringed with cattail.

2.2.1.3 Groundwater

A discussion of the existing groundwater conditions within the Project vicinity is provided in Section 2.2.1.3 of the DEIS. Due to the amount of time that has passed since the preparation of the DEIS, a new request has been sent to the Chautauqua County Department of Health (DOH) to obtain the location of groundwater wells, aquifers, and potable water sources within the Project vicinity. In response to this request, the locations of 41 private and public water wells were provided (see Appendix C of this SEIS2), which are shown in Figure 11 of this SEIS2.

2.2.2 Anticipated Impacts

2.2.2.1 Construction

Surface Waters and Wetlands

A discussion of the nature of any anticipated impacts to surface waters and wetlands resulting from Project construction is provided in Section 2.2.2.1 of the DEIS. These impacts will typically result from constructing access roads, trenching collection lines, and creating temporary workspaces around turbine locations. Direct impacts would include excavating, placing fill in wetlands, and clearing wetland vegetation. Indirect impacts to wetlands from construction include increased erosion and sedimentation.

To avoid or minimize permanent impacts to streams and wetlands, preliminary and final Project design will be guided by the following criteria during the siting of wind turbines and related infrastructure:

- Large built components of the Project, including wind turbine generators, the staging area, O&M facility, collection station and interconnection substation will be sited to avoid wetlands to the maximum extent practicable
- The number and acreage of wetland impacts due to access road crossings will be minimized by routing around wetlands whenever possible and utilizing existing crossings and narrow crossing locations to the extent practicable.
- Buried 34.5 kV electric interconnect lines will avoid crossing forested wetlands whenever possible, cross wetlands at narrow points, and will utilize installation techniques that minimize temporary wetland impacts.
  The overhead generator lead line will be designed to span wetlands whenever possible (i.e., minimize the number of structures in wetlands), and cross wetlands at existing narrow points.

Other Project area environmental or logistical constraints, such as Project participants/lease holders, landowner concerns, and existing buried utilities, may make further avoidance of wetlands and streams unfeasible.

Based on an analysis of the proposed Project layout with respect to delineated wetlands (Figure 10 of this SEIS2), Project construction associated with the 36 proposed, and two alternate turbines will result in disturbance of vegetation in a total of approximately 100.5 acres of wetlands. Of this total, 94.7 acres would be allowed to regenerate following construction. Additionally, a total of approximately 48.96 acres of wetland soil disturbance is anticipated, of which 43.18 acres would be restored after construction through appropriate wetland restoration techniques. The remaining 5.78 acres would be permanently converted to built facilities. Project construction will also impact approximately 9,660.76 linear feet of stream, of which 8,196.68 linear feet are temporary and 1,464.08 are permanent. Table 12 (below) presents the permanent and temporary impacts to wetlands that would result from the construction and operation of the Project facilities. Additionally, Table 13 (below) presents the permanent and temporary impacts to streams and drainage features resulting from Project construction and operation.

Table12. Impacts to Wetlands from Project Construction and Operation

NWI Cover Type[1] by Project Facility		Temporary Soil Disturbance (acres)	Permanent Soil Disturbance and Forested Wetland Conversion (acres)
Access Roads			
	PEM	2.2	3.44
	PSS	0.29	0.43
	PFO	1.05	1.67
Underground Collection System			
	PEM	5.21	0
	PSS	0.64	0
	PFO	3.11	0
Generator Lead Line			
	PEM	0.33	< 0.001
	PSS	0.13	< 0.001
	PFO	0.58	0
	POW	0.02	0
	Cover Class Conversion[2]	0	27.33
Laydown Areas			
	PEM	5.6	0
	PSS	0	0
	PFO	0	0
O&M Building			
	PEM	0	0.1
	PSS	0	0
	PFO	0	0
Substation			
	PEM	0	0.04
	PSS	0	0
	PFO	0	0
Turbines			
	PEM	12.67	0.07
	PSS	1.88	0

	PFO	9.47	0.03
	Cover Class Conversion[2]	0	9.47
Subtotal by Facility			
	Subtotal Access Roads	3.54	5.54
	Subtotal Underground Collection System	8.96	0
	Subtotal Generator Lead Line	1.06	< 0.001
	Subtotal Laydown Area	5.6	0
	Subtotal O&M Building	0	0.1
	Subtotal Substation	0.04	0.04
	Subtotal Turbines	24.02	0.1
Subtotal by Cover Type			
	Subtotal PEM	26.01	3.65
	Subtotal PSS	2.94	0.43
	Subtotal PFO	14.21	1.7
	Subtotal POW	0.02	0
Total Soil Disturbance		**43.18**	**5.78**
Total Cover Class Conversion[2]		**0**	**36.8**

[1]NWI cover types are abbreviated as follows: PEM = palustrine emergent, PSS = palustrine scrub/shrub, PFO = palustrine forested, POW = Artificial Ponds

[2]Cover class conversion represents the area of forested wetlands that would be permanently converted to non-forested palustrine wetlands through routine vegetation maintenance practices under the generator lead line and around wind turbine foundations.

Table 13. Impacts to Streams and Drainage Features for SEIS2 Project Layout

NWI Cover Type by Project Facility		Temporary Soil Disturbance (linear feet)	Permanent Soil Disturbance (linear feet)
Access Roads			
	Stream		

	Perennial	234.02	407.98
	Intermittent	956.17	1016.76
	Ephemeral	23.3	39.34
	Drainage	1275.08	2098.33
Underground Collection System			
	Stream		
	Perennial	502.82	0
	Intermittent	1783.94	0
	Ephemeral	73.39	0
	Drainage	3487.09	0
Generator Lead Line			
	Stream		
	Perennial	159.25	0
	Intermittent	77.38	0
	Ephemeral	45.62	0
	Drainage	257.8	0
Turbines			
	Stream		
	Perennial	1530.78	0
	Intermittent	2810.01	0
	Ephemeral	0	0
	Drainage	1540.68	0
Subtotal by Cover Type			
	Subtotal Perennial	2426.87	407.98
	Subtotal Intermittent	5627.5	1016.76
	Subtotal Ephemeral	142.31	39.34
	Subtotal Streams	**8196.68**	**1464.08**
	Subtotal Drainage	**6560.65**	**2098.33**
Total Soil Disturbance		**14757.33**	**3562.41**

Clearing within forested wetlands is also considered a long-term impact because it results in a conversion to emergent or scrub/shrub wetlands. Of the 100.5 acres of wetland vegetation clearing that is possible for the Project (including the two alternate turbine locations), 10.2 acres would be to wetland forest that was cleared and allowed to regenerate. This includes areas along buried interconnect, access roads, and temporary road improvements. An additional 36.8 acres of forested wetland would be converted to emergent or scrub/shrub wetlands through continual clearing under overhead collection line and around turbine foundations. Many wetlands delineated in the Project Site contain multiple cover types (for example, part is forested and part is emergent). In order to conservatively estimate impacts from forested wetland clearing, any wetlands that were even partially forested were included in the calculation of forested wetland impacts.

For the purposes of this SEIS2, it is assumed that construction of the wind turbine foundations would require the permanent conversion of lands within a 50-foot radius of the turbine site for Project facilities, and temporary disturbance within a 250-foot radius (see Section 1.6, Table 3 for assumed temporary and permanent soil disturbance impacts from Project components). The Project was sited to avoid placing turbines within 100 feet of wetlands and streams to the maximum extent practicable. Where wetlands occur within 250 feet of a turbine, work areas will be shifted to avoid temporary impacts wherever possible. Additionally, due to their protected status, NYSDEC regulated wetlands as well as a 100-foot buffer around them were avoided to the maximum extent practicable. Construction of the 36 proposed, and two alternate turbines would result in the temporary disturbance of about 24.02 acres of wetlands and about 4,340.79 linear feet of stream. Additionally, approximately 0.10 acres of wetlands and no streams would be permanently impacted.

It is assumed that construction of access roads would result in temporary vegetation clearing within a 100-foot corridor and a temporary soil disturbance within a 54-foot corridor. Within that, a 34-foot corridor would be permanently impacted through construction of the access roads. Where proposed access roads will be constructed along existing roads, the additional temporary vegetation clearing, temporary soil disturbance, and permanent soil disturbance are all assumed to be an additional 50 feet per linear foot of road. Project access roads were sited to reduce impacts to wetlands, although some impacts are unavoidable despite this careful siting. Construction of access roads serving the 36 proposed, and two alternate turbines would result in temporary disturbance of about 3.53 acres of wetlands and 1,213.49 linear feet of stream and permanent loss of about 5.54 acres of wetlands and 1464.08 linear feet of stream.

The electrical collection system is anticipated to be entirely buried. For the purposes of this SEIS2, it is assumed that buried collection lines could result in up to 75-foot wide corridors in which the vegetation is cleared during construction and within that, 35-foot wide corridors in which the soil is temporarily disturbed. Buried collection lines result in no permanent soil disturbance, however, as discussed above, vegetation is cleared continually along buried collection lines to keep them accessible for repair. Construction of collection line serving the 36 proposed turbines would result in the temporary disturbance of about 8.96 acres of wetlands and 2360.15 linear feet of stream. No permanent impacts to wetlands or stream would result from construction of the buried collection lines.

The overhead generator lead line will result in 150-foot corridors for vegetation clearing, 12-foot wide temporary soil disturbance for construction access, and a permanent soil disturbance equal to the pole footprint. Construction of the generator lead line would result in temporary impacts to approximately 1.07 acres of wetlands and 282.25 linear feet of stream. Less than 0.001 acres of permanent impact to wetlands, and no permanent impacts to streams are anticipated from construction of the generator lead line.

The locations for the meteorological tower, the O&M building, the laydown yard, and the Project substation have been sited to avoid temporary and permanent impacts to wetlands to the maximum possible extent, including forested wetland conversions. The O&M building and substation will result in 0.10 acres and 0.04 acres of permanent impact to wetlands respectively. The laydown yard will result in 5.6 acres of temporary wetland impact. Timber matting will be used, as needed, to accommodate temporary vehicular access across wetlands during construction. Wherever feasible, buried electrical interconnect lines will be installed co-linear with access roads to minimize disturbance to wetlands.

Following Project construction, temporarily impacted wetland areas will be restored. Restoration activities are anticipated to include the following:

- 200-foot radius turbine workspaces will be reduced to a permanent footprint of 0.24 acre comprising of a 160-foot by 65-foot gravel crane pad and skirt around the turbine.
- The 100-foot crane paths outside of the access road widths will be allowed to regenerate naturally.
- Buried electrical interconnect line routes will be allowed to regenerate naturally.

Groundwater

A discussion of the nature of any anticipated impacts to groundwater resulting from Project construction is provided in Section 2.2.2.1 of the DEIS, and summarized below.

Excavations for foundations, roadways, and underground collector lines are expected to be relatively shallow, and are not anticipated to intercept groundwater within the surrounding aquifers. The Project will add only small areas of impervious surface, which will be dispersed throughout the Project area, and will have a negligible effect on groundwater recharge. However, construction of the proposed Project could result in certain localized impacts to groundwater, and the use of that water by adjacent landowners. These impacts could include:

- Minor localized disruption of groundwater flows down-gradient of proposed turbine foundations;
- Minor modification to surface runoff or stream-flow, thereby affecting groundwater recharge characteristics;
- Minor degradation of groundwater chemical quality from accidental spills and installation of concrete foundations; and
- Impacts to groundwater recharge areas (wetlands);
- Groundwater migration along collection line trenches.

Installation of the concrete foundations could cause a temporary, localized increase in groundwater chemistry (pH) during the curing process. This effect will not extend beyond the immediate area of the foundation and will not adversely affect groundwater quality. In the event that a perched groundwater condition should be encountered at a turbine site, temporary construction dewatering methods would be employed. Turbine foundations have typically been designed to resist hydrostatic forces, when required, rather than installing permanent drainage systems. Prior to Project construction, soil borings will be conducted to determine groundwater levels (among other factors) at the turbine locations. Should shallow/perched groundwater be encountered, related potential construction impacts are anticipated to be addressed through relatively common engineering measures and construction techniques.

In addition to impacts to groundwater due to turbine foundation installation, minor impacts could result from the installation of buried interconnect lines which may facilitate groundwater migration along trench backfill in areas of shallow groundwater. Due to the decompaction of soils within the trench of the buried interconnect, water could collect in the trench and migrate through the trench to areas of lower elevation, where it is naturally allowed to infiltrate back into the water table with negligible loss of volume.

An additional potential impact to groundwater is the introduction of pollutants to groundwater from the accidental discharge of petroleum or other chemicals used during construction, operations or maintenance. Such discharges could occur in the form of minor leaks from fuel and hydraulic systems, as well as more substantial spills that could occur during refueling or due to mechanical failures and other accidents. However, construction of the Project will adhere to a Spill Prevention Control and Countermeasure (SPCC) plan (Appendix F) and a SWPPP (Appendix G) to prevent contamination and/or erosion due to surface runoff, thereby avoiding significant adverse impacts.

2.2.2.2 Operation

Surface Waters and Wetlands

Impacts to surface waters and wetlands primarily occur during Project construction. The operation of the constructed facility is not anticipated to have significant adverse impacts to wetlands, streams, or other surface waters within the Project vicinity. Vehicular access to the turbines, substation, collection station, meteorological tower, and O&M facility will be completely established during Project construction, and routine operation and maintenance procedures are not anticipated to result in significant additional impacts. Minor and isolated incidences of impact may occur, during Project operation, including buried electrical collector line maintenance, access road washouts, culvert replacement/maintenance, or accidental fuel/chemical spills. All of these activities could have minor impacts on surface waters and wetlands. Appropriate operational procedures, training and mitigation measures (such as spill kits in all vehicles) will be implemented during the operational phase of the Project to mitigate these potential impacts. All repair activities will be in accordance with all applicable federal, state, and local permits and associated conditions/requirements.

To the extent practicable, all major repairs will be facilitated through use of existing Project-related infrastructure (e.g., permanent gravel access roads, crane pads, etc.). If existing infrastructure is not adequate to accommodate certain repairs, any additional infrastructure improvements will be conducted in accordance with the applicable regulations (e.g., widening of an access road within or adjacent to a wetland will be conducted in accordance with Sections 401 and 404 of the Clean Water Act, and Article 15 of the Environmental Conservation Law, as applicable). Please see the Appendix B (decommissioning plan) for a discussion of environmental considerations during decommissioning activities.

Groundwater

Most potential impacts to groundwater will occur during construction only. Over the long term, addition of small areas of impervious surface to the Project area in the form of permanent access roads, crane pads, the O&M facility, and the substations will have a minimal effect on groundwater recharge. Turbine foundations installed below the water table are not anticipated to have any measurable long-term effect on groundwater levels or flow patterns. The migration of groundwater along buried collector line trenches could have a minor effect on groundwater flow paths, and the ongoing potential for chemical spills during operation/maintenance could also affect groundwater.

2.2.3 Proposed Mitigation

A discussion of the measures to mitigate any anticipated impacts to water resources within the Project vicinity is provided in Section 2.2.3 of the DEIS. The Project has been designed to avoid and minimize impacts to wetlands to the greatest extent practicable. To mitigate for unavoidable permanent impacts to wetlands and waterbodies resulting from Project development and operations, the Applicant will continue to consult with the USACE and NYSDEC regarding acceptable and appropriate mitigation measures. Mitigation options range from creating new wetlands to preserving existing wetlands, and ultimately the final approved mitigation will compensate for the loss of wetlands due to Project-related activities. The final establishment of mitigation for unavoidable permanent wetland impacts would be determined through the permitting process with the NYSDEC and USACE. Impacts to streams and wetlands will be avoided and minimized through crossing waterbodies in the fewest locations practicable and giving preference to existing crossings or narrow crossings. BMPs recommended by the NYSDEC and USACE and established in the wetland permits conditions would be implemented where wetland and waterbody disturbance is necessary. It is not anticipated that the Project will impact wetlands and waterbodies as a result of modified stormwater drainage, due to the minimal increase of impervious area resulting from Project construction and operation. However, potential stormwater impacts to wetlands and waterbodies would be addressed and mitigated for in the Stormwater Pollution Prevention Plan (SWPPP) that will be provided in the FEIS. The SWPPP that was prepared for EDPR's Marble River Project is attached to this SEIS2 as Appendix G. The Marble River SWPPP is substantially similar to the one that will be prepared for the Arkwright Summit Wind Project.

Furthermore, potential impacts to wetlands and waterbodies resulting from the possible release of hazardous substances would be addressed and mitigated for in the Spill Prevention, Control and Countermeasure (SPCC) Plan. The SPCC Plan will describe mandatory BMPs that will be implemented to prevent and minimize potential impacts to wetlands and waterbodies in the event of an accidental hazardous substance spill. The SPCC Plan that was prepared for EDPR's Marble River Project is attached to this SEIS2 as Appendix F. The Marble River SPCC Plan is substantially similar to the one that will be prepared for the Arkwright Summit Wind Project.

2.3 BIOLOGICAL, TERRESTRIAL, AND AQUATIC ECOLOGY

2.3.1 Existing Conditions

2.3.1.1 Vegetation and Ecological Communities

Vegetation and ecological communities within the Project Site are generally as described in the DEIS. Slight changes to the Project Site boundaries have resulted in changes to the acreage of land cover types since the DEIS and SEIS. The current SEIS2 Project Site now encompasses approximately 3,883 acres of land. In order to assess current land cover types within the Project Site, EDR used existing aerial imagery and ground-level reconnaissance to determine the land cover type in each parcel of land participating in the Project (Figure 12 of this SEIS2). Each land cover type within the Project Site and its respective acreage is presented in Table 14 below.

Table 14. Land Cover Types/Vegetative Communities Within the Project Site

Vegetative Community	Acres	Percent Cover (%)
Agricultural	883.6	23%
Disturbed/Developed	82.5	2.1%
Forestland	2751.1	71%
Open water	7.9	< 1%
Successional Shrubland/Old Field	157.5	4.0%
Total	3,882.5	

From the above table, the majority (71%) of the Project Site is comprised of forestland, with agricultural land (23%) representing the second most prevalent land cover type. Successional shrubland/old field represents 4.0% of the Project Site, while disturbed and developed areas comprise 2.1%. Less than one percent of the Project Site consists of open water.

2.3.1.2 Significant Ecological Communities and Rare Plant Species.

A written reply dated May 15, 2015 to a request for information regarding listed threatened and endangered species, and sensitive or significant habitats was received from the New York State Natural Heritage Program (NHP) (see Appendix C. The NHP reply did not identify any rare plants species as occurring within the Project Site. However, the NHP reply identified "Rich Hemlock-Hardwood Peat Swamp" as a significant natural community that occurs in the vicinity of the Project Site. By meeting certain documented criteria, the NHP considers this community occurrence to have high ecological and conservation value. The NHP identifies this community type as occurring in the West Mud Lake Swamp, and the West Branch of Conewango Creek. In addition to correspondence with the NHP, the United States Fish and Wildlife Service (USFWS) Information for Planning and Conservation (IPaC) system was consulted for information pertaining to federally listed wildlife species. The IPaC system did not identify any federally listed plant species or critical habitats as occurring within the Project vicinity (see Appendix C).

2.3.1.3 Wildlife and Terrestrial Habitat

In general, the discussion of wildlife and terrestrial habitat within the Project Site provided in Section 2.3.1.3 of the DEIS remains relevant to the revised Project. Results of the baseline wildlife studies conducted in 2005 and 2007 are discussed in Section 2.3.1.3 of the DEIS. These included avian point count surveys conducted in both 2005 and 2007, and nocturnal radar, breeding bird, bat acoustic and sensitive wildlife surveys conducted in 2007. Since the completion of the DEIS, several additional studies to characterize avian and bat use and habitats in the Project vicinity have been completed or are ongoing. These include a habitat assessment for sensitive grassland bird species conducted in 2009; breeding bird, eagle observation, and raptor roadside broadcast call surveys conducted in 2013; spring raptor migration surveys and breeding bird surveys conducted in 2015; and ongoing winter grassland raptor surveys, eagle observation surveys, and northern long-eared presence/absence surveys initiated in early 2015.

2.3.1.3.1 Birds

To identify birds that could be impacted by the Project, multiple desktop studies and avian surveys have been conducted by Western EcoSystems Technology Inc. (WEST) subsequent to the preparation of the DEIS and SEIS. These include a sensitive grassland bird study conducted in 2009, and breeding bird surveys, a broadcast call study for nesting raptors, and an eagle observation study conducted in 2013. These studies are summarized below and included in Appendix H. Additionally, WEST also conducted breeding bird surveys, raptor migration surveys, eagle observation surveys, winter grassland bird surveys, and surveys for the northern long-eared bat during 2015. Preliminary summaries of the 2015 studies are also provided below, and the final versions of both the 2015 breeding bird survey and the northern long-eared bat survey report are included in Appendix H.

2009 Sensitive Grassland Bird Habitat Assessment

A habitat assessment was conducted for five sensitive species of grassland birds: Henslow's sparrow (*Ammodramus henslowii)*, grasshopper sparrow (*Ammodramus savannarum)*, upland sandpiper (*Bartramia longicauda)*, short-eared owl (*Asio flammeus*) and northern harrier (*Cirus cyaneus*) (Tidhar et al. (2009). The objectives of the habitat assessment were to: 1) identify and characterize grassland habitat within the project boundary and the area within a

1.5 mile buffer around the project as optimal or sub-optimal for suitability and utilization by the target species, and 2) ground-truth potential habitat to provide information regarding sensitive species for use in project planning and design. Optimal habitat was defined based on current scientific literature. Land use/land cover maps, topographic maps, and aerial imagery maps were initially used to delineate areas with vegetative features potentially suitable for use by the target species, with specific focus on areas of proposed construction of permanent infrastructure (wind turbines). A field survey was conducted from June 22-24, 2009. Much of the potential grassland bird species habitat within the Project Site is found along road corridors where active management of the land has kept the area from becoming reforested. Classifications of grassland types were active agriculture (hay fields, cultivated row crops or orchards) and abandoned old field (successional land reverting to forest). Optimal habitat is further defined by size, shape and presence/absence of habitat components; forbs, perches, water or bare ground. In the SEIS2 Project layout, three wind turbine locations are proposed adjacent to or within areas considered optimal grassland habitat for sensitive grassland bird species (Turbines 110, 103, and 49). An additional three sites outside of the project boundary, but within the 1.5-mile buffer zone, also were identified as optimal habitat areas.

2013 Broadcast Call Survey for Nesting Raptors

Forest-nesting raptors, including the red-shouldered hawk, a New York State Species of Special Concern, have been documented breeding in the vicinity of the Project. Therefore, broadcast surveys were conducted to obtain information on species of forest raptors potentially nesting in the study area and to supplement other raptor surveys conducted at the site (Lukins and Young 2014). Sixty call stations were established on public roads in the Project vicinity within or adjacent to forest habitat. Broadcast surveys elicited a total of 16 responses (vocal or visual) from three species (13 red-shouldered hawk, 2 red-tailed hawk, 1 American kestrel) at eight of the 60 call stations.

2013 Breeding Bird Surveys

The primary objective of the breeding bird surveys (BBS) was to provide an estimate of the type, number, and level of use of bird species using the Project Site during the breeding season (Lukins et al. 2013a). Another objective was to obtain pre-construction baseline data on breeding bird abundance and composition that will be compared to similar data collected post-construction so that displacement effects can be measured. Surveys were conducted primarily using methods described in the NYSDEC Guidelines (NYSDEC 2009).

Seventy-three bird species were recorded during the breeding bird transect surveys, and the species richness was 6.45 species per transect per survey (see Appendix H). A total of 1,168 bird observations within 914 separate groups were recorded. Approximately 95 percent of all birds observed were passerines, and the most commonly observed passerine subtypes were blackbirds/orioles (n=375), warblers (n=168), thrushes (n=147), and grassland sparrows (n=123). Overall mean use was 13.71 birds per transect per survey. Cumulatively, five species (6.8% of all species) comprised 52.1% of the birds observed: bobolink (*Dolichonyx oryzivorus*), red-winged blackbird (*Agelaius phoeniceus*), red-eyed vireo (*Vireo olivaceus*), American robin (*Turdus migratorius*) and savannah sparrow (*Passerculus sandwichensis*). Two New York State Department of Environmental Conservation species of special concern, cerulean warbler (n=2) and American bittern (n=1) were observed during the surveys. There was no significant difference between bird type use at turbine and reference transects. Overall mean bird use was highest (27.00 birds/survey) at one of the transects located in grassland at a proposed turbine location. Among reference transects, highest mean bird use was 17.25 birds per survey along a transect also located where the dominant landcover was grassland. While passerines dominated the species composition at all transects, no noticeable differences in composition were observed between the turbine and reference transects.

2013 Eagle Observation Surveys

The primary objective of the eagle observation surveys was to provide information regarding levels of use by bald eagles near potential turbine locations during the late spring and summer periods (May 25 to August 30; Lukins et al. 2013b). Surveys were conducted primarily using methods described in the USFWS Eagle Conservation Plan Guidance (ECPG) (USFWS 2013). During the surveys, additional data were collected on other raptors (e.g., buteos, vultures, accipiters, falcons) observed to: 1) allow comparison with data collected during the 2007 site studies, 2) allow comparison to data collected during numerous comparable studies at other wind energy projects throughout the northeast and eastern U.S., and 3) to provide information on the potential occurrence of other sensitive grassland raptor species and use of the Project vicinity. These types of observational surveys are currently recommended by the USFWS for characterizing levels of eagle use and for calculating risk of a proposed wind energy project to eagles (USFWS 2013), as well as for calculating overall avian risk as part of the USFWS Land-Based Wind Energy Guidelines (USFWS 2012). A total of 82 60 minute surveys were conducted within the Project Site, during which one bald eagle was observed, resulting in an eagle use value of 0.01 eagles per plot per survey. Eight other bird species were observed during the eagle surveys, totaling 239 bird observations within 142 separate groups. The most abundant species seen were turkey vulture (92 observations), American crow (50), red-tailed hawk (42), and American kestrel (36). Other species seen included Canada goose (14), sharp-shinned hawk (3), common raven (1), and great blue heron (1).

2015 Breeding Bird Survey

To supplement the breeding bird studies conducted in 2007 and 2013, additional breeding bird surveys were initiated on May 20, 2015 using the same methods and transect locations as used during the 2013 BBS surveys. Each transect was surveyed four times between May 20 and July9, 2015. 83 species were identified during the BBS, and a total of 1,495 groups totaling 1,627 birds were observed (see Appendix H). The most abundant species observed were red-winged blackbird, red-eyed vireo, bobolink, song sparrow, and American redstart. No federally listed species were observed. The only New York state listed or species of special concern observed were one Cooper's hawk and one cerulean warbler, both classified as New York State species of special concern. Results of the 2013 and 2015 BBS surveys provide baseline data on breeding bird abundance and composition at turbine and reference sites. Similar surveys will be conducted after the Project is operational, under a Before/After – Control/Impact (BACI) study design to assess displacement effects to breeding birds after the project is operational. In addition, a gradient analysis (Morrison et al. 2001) will be used to investigate the relationship between density of avian species and distance from turbines.

2015 Spring Raptor Migration Surveys

To supplement the raptor migration surveys conducted at the Project Site in 2005 and 2007 as discussed in the DEIS, additional raptor migration surveys were conducted in the spring of 2015. The objective of the spring raptor migration survey (RMS) was to estimate the spatial and temporal use of the Project by migrating raptors and vultures. The RMS was conducted according to methods used by the Hawk Migration Association of North America (HMANA). One survey point selected to provide good visual coverage to the south was established within the Project to survey for migrating raptors. Surveys were conducted approximately twice per week during April and May. Survey periods were approximately eight hours per survey day and occurred between 9:00 am and approximately 6:00 pm to cover the most active time period for migrating raptors.

Sixteen surveys were conducted from April 11 through May 29, 2015, and 19 species were observed. A total of 618 individuals within 407 groups were recorded. The most abundant species observed were turkey vulture (323 individuals), red-tailed hawk (118), and broad-winged hawk (61). Twenty-two bald eagles and five golden eagles also were observed, although not all these observations were within the Project area. Non-raptor species observed included common loon (2), double-crested cormorant (3), great blue heron (5), Canada goose (8) and hooded merganser (5). In addition to bald eagles (classified as New York state threatened), five golden eagles (classified as New York state endangered) and nine northern harriers (classified as New York state threatened), were observed during raptor migration surveys. New York state species of special concern observed during the surveys included 13 red-shouldered hawks, 15 Cooper's hawks, six sharp-shinned hawks, seven ospreys, and two common loons.

2015 Eagle Observation Surveys

To supplement the eagle observation surveys conducted in 2013, additional eagle observation surveys were initiated in the Project vicinity on January 15, 2015 using methods described in the USFWS ECPG (USFWS 2013). The recommended level of survey effort for projects which have existing data, or Tier 1 and 2 studies (USFWS 2012) that suggest the risk to eagles is moderate (Category 2), is one survey-hour per survey location per month, with a total annual survey effort of at least 200 hours. To address this recommendation, each of the six plots is being surveyed for 60 minutes approximately twice per month from November through February and three times per month from March through October. In addition to the analyses recommended in the USFWS ECPG, spatial patterns in eagle and other raptor use in the study area will be investigated by comparing use and observations among survey plots. The viewshed within the 800 meter radius of each point as well as within a larger buffer of maximum viewshed surrounding each point will be overlaid with a grid of 100 m x 100 m cells. Mapped eagle flight paths as well as locations of perched eagles will be used to assign use intensity levels for each cell within the grid to determine areas of relatively high, moderate, or low eagle use.

A total of 90 60 minute surveys were conducted within the Project Site from January 15 to June 17, 2015, during which five groups totaling six bald eagles were observed, resulting in an eagle use value of 0.07 eagles per plot per survey. Seven other bird species were observed during the eagle surveys, totaling 64 bird observations within 55 separate groups. The most abundant raptor species seen were red-tailed hawk (29 observations) and turkey vulture (17). Four northern harriers, also classified as New York State threatened, were observed during the eagle use surveys. New York state species of special concern observed during the eagle use surveys included seven red-shouldered hawks and two sharp-shinned hawks.

2015 Winter Grassland Bird Surveys

Winter grassland bird surveys have not previously been conducted in the Project Site. The primary objective of the winter grassland surveys is to provide information on the levels of use by New York state species of special concern (e.g., northern harrier, short-eared owl) near potential turbine locations. Surveys are being conducted primarily using methods described in the NYSDEC Draft Project Applicant Survey Protocol for State listed Wintering Grassland Raptor Species (NYSDEC 2014). Eight survey points were established approximately 800 m apart along roads in the Project Site that border grassland areas and fields. Surveys are being conducted from January through March and from November through December 2015. The surveys are being conducted during the 1.5-hour evening crepuscular period, approximately one hour before sunset to one-half hour after sunset. Each plot is being surveyed for a 5-minute period once per week following the roadside count method recommended by the NYSDEC (NYSDEC 2014). During November and December, two of the eight points will be surveyed each week for the entire 1.5-hour crepuscular period following the evening survey method recommended by the NYSDEC (NYSDEC 2014). Spatial patterns in short-eared owl and northern harrier use in the study area will be analyzed by comparing use and observations among survey plots. Spatial patterns in use for other raptors and species of interest observed will also be compared among survey plots to the extent practicable.

A total of 96 surveys were conducted from January 16 through April 16, 2015. Two species were observed during the surveys, including four groups totaling five red-tailed hawks and one sharp-shinned hawk. No northern harriers or short-eared owls were observed.

2.3.1.3.2 Mammals

2015 Northern Long-Eared Bat Presence/Absence Surveys

To supplement the bat studies conducted in 2007, additional surveys were initiated in June 2015 to survey for the threatened northern long-eared bat (see Appendix H). Surveys were conducted using methods described in the Northern Long-eared Bat Interim Conference and Planning Guidance (USFWS 2014) and the 2015 Range-Wide Indiana Bat Summer Survey Guidelines (USFWS 2015). Because the project consists of a series of linear features such as strings of turbines, access roads, collection lines, and a transmission line that create linear disturbances within the forested vegetation, the USFWS Linear Project Guidance was used to evaluate the project to determine the survey effort. The USFWS Interim Guidelines specify that acoustic surveys to determine presence/absence of northern long-eared bats follow guidelines published by the USFWS for acoustic presence/absence surveys for Indiana bats (USFWS 2014). Following this guidance, the level of effort for the acoustic survey is one station per linear km of disturbance within potential northern long-eared bat habitat. Survey locations were established at least 200 m apart and were spread throughout the Project Site to ensure a representative sample of the area. Each location was surveyed for at least 2 nights. The northern long-eared bat survey window in the USFWS guidelines is May 15 to August 15. The surveys were initiated on June 15 to minimize the chances of survey nights not meeting the minimum requirements for nighttime temperature. AnaBat detectors were used for the survey. Detectors were placed in locations with high probability of *Myotis* bat activity, including small clearings and forest-canopy openings, near water sources, parallel to woodland edges, and road and/or stream corridors with open tree canopies or canopy heights greater than 10 m (USFWS 2014b).

Following current guidance from the USFWS (2014b), acoustic data collected during presence/absence surveys was submitted to two candidate software programs designed to perform probabilistic species identification of bat echolocation call data: BCID (Ryan Allen, Bat Call Identification, Inc.) and EchoClass version 2.0 (Eric Britzke, ERDC). All of the acoustic data for each night that either software program identified calls as those from northern long-eared bat were qualitatively assessed by a qualified acoustic bat biologist. Based on this analysis process, a northern long-eared bat call was recorded at one of the sampling stations on one night during the survey. The results of this survey suggest that, while northern long-eared bat may be present, the density of this species in the Project Site is very low.

Mammals other than Bats

For a discussion of existing conditions within the Project vicinity with respect to mammals other than bats, please refer to Section 2.3.1.3 of the DIES.

2.3.1.3.3 Reptiles and Amphibians

For a discussion of reptiles and amphibians in relation to the Project, and a list of reptile and amphibian species that are likely to occur within the Project Site, see Section 2.3.1.3 of the DEIS.

2.3.1.3.4 Fish

For a discussion of fish species likely to occur within the Project vicinity, see Section 2.3.1.3 of the DEIS.

2.3.1.3.5 Wildlife Habitats

For a discussion of the various wildlife habitats and the species that they support which are found within the Project vicinity, refer to Section 2.3.1.3 of the DEIS.

2.3.1.4 Threatened and Endangered Species

The discussion of threatened and endangered wildlife species within the Project Site provided in Section 2.4.1.4 of the DEIS generally remains relevant. However, species being added to and removed from state and federal lists is a continual process and new information comes to light regarding species distributions, threats, and recovery. Consequently, an updated discussion of the threatened and endangered wildlife species that could occur within the Project Site is provided below.

Site-specific correspondence and database review with NYNHP and USFWS identified several threatened, endangered, candidate, and sensitive wildlife species that could potentially occur within the Project Site (See Appendix C of this SEIS2. NHP records indicate that two New York State-listed species have been documented within the Project vicinity. The first is the Henslow's Sparrow *(Ammodramus henslowii)*, which is listed as threatened by New York State, and was most recently documented in the Project Site in 1985. The second species is the great blue heron (*Ardea Herodias*), which is listed as a protected bird by New York State, and for which a breeding rookery within the Project Site was identified in 1995. However, as described in Section 2.3.1.5 of the SEIS, correspondence between the Applicant, the NYSDEC, landowners, and WEST (who conducted the avian resources study for the Project), indicated that the heron rookery in question had been abandoned for a number of years prior to the development of the Project.

In addition to agency correspondence, the Breeding Bird Atlas (BBA), New York State Amphibian and Reptile Atlas (NYSDEC, 2007a), and results of site-specific wildlife studies conducted by WEST subsequent to the preparation of the DEIS were consulted in order to identify any additional listed species documented in the area. Table 15 indicates the status of each of the listed species documented in the area, and indicates whether the species is expected based on agency correspondence, BBA consultation, observation on the Project site, or any combination of these. No critical habitat for any USFWS listed species occurs within the Project site.

Table 15. New York State Listed Wildlife Potential Occurring within the Project Site.

Species	NYS Status	Ecology
Short-eared owl *Asio flammeus*	Endangered	Found in open country, such as prairie, meadows, marshes, and open woodland. More common as a winter residents in New York State. Limited habitat for this species occurs within the project site, but it has not been observed during any of the avian surveys conducted to date.
Golden Eagle *Aquila chrysaetos*	Endangered	Mostly nests in cliff ledges, but also in trees. Generally prefers open areas such as grasslands and fields where they hunt small to medium sized mammals. 5 individuals were detected during the 2015 spring raptor migration survey.
Bald eagle *Haliaeetus leucocephalus*	Threatened	Usually breeds in riparian, lacustrine, and habitat associated with other water bodies. Preferentially roosts in conifers. May transiently utilize habitat within the Project Site. This species was documented within the Project Site during eagle use surveys in 2013 and 2015. Also detected in the 2015 raptor migration survey. The NYSDEC has records of several breeding territories within 10 miles of the Project site.
Henslow's sparrow *Ammodramus henslowii*	Threatened	Often found in patchy, weedy old fields. Suitable habitat occurs within the Project Site in the form of abandoned fields. This species has not been detected during any of the BBS conducted at the site, but has been detected on the nearby BBS Route.
Osprey *Pandion haliaetus*	Special Concern	A large bird of prey that feeds primarily on fish. Often nests at the top of a dead tree or artificial structures. Nests are frequently re-used for multiple

Species	NYS Status	Ecology
		years. This species was detected during the 2015 spring raptor migration survey.
Northern harrier *Circus cyaneus*	Threatened	Found in meadows, grasslands, marshes, and cultivated fields. Nests on the ground, often in shrubby habitat. Suitable habitat for this species occurs within the Project Site. According to the NY BBA this species is a common breeding resident raptor in NY. This species has been detected during avian surveys at the site during all years of study.
Sedge wren *Cistothorus platensis*	Threatened	Usually found in moist, tall-grass meadows with scattered bushes. There may be suitable habitat within the Project Site for this species, but no breeding records exists for Chautauqua County, and it has not been detected during any of the BBS conducted at the site.
Upland sandpiper *Bartramia longicauda*	Threatened	An obligate grassland species that utilizes agricultural areas and other grassland habitats. Last detected by the BBS in 1987 and 1989, and may exist within the vicinity of the Project Site. This species has not been detected during any of the BBS conducted at the site.
Cooper's hawk *Accipiter cooperii*	Special Concern	Forest-dwelling raptor that breeds in deciduous, mixed, and coniferous forests. Suitable habitat for this species occurs within the Project Site. This species was documented during 2015 avian surveys at the site in low numbers.
Grasshopper sparrow *Ammodramum savannarum*	Special Concern	Preferentially breeds in grasslands of intermediate height. Occasionally found in cropland. Suitable habitat exists within the Project Site. This species has not been detected during any of the BBS conducted at the site.
Red-shouldered hawk *Buteo lineatus*	Special Concern	Forest-dwelling buteo that prefers wet areas such as swamps and forested wetlands. Suitable habitat for this species occurs within the Project Site. This species was detected during avian surveys at the site.

Species	NYS Status	Ecology
Sharp-shinned hawk *Accipiter striatus*	Special Concern	Forest-dwelling raptor found in deciduous or mixed woodlands. Suitable habitat for this species is within the Project Site. This species was detected during avian surveys at the site.
Vesper sparrow *Pooecetes gramineus*	Special Concern	Found in field, prairie, pastures, and shrublands. Nest on ground. Suitable habitat exists within the Project Site for this species. This species has not been detected during any of the BBS conducted at the site but there are records in the BBS and BBA.
Horned lark *Eremophila alpestris*	Special Concern	Occupies areas with short grasses and barren ground. Commonly nests in row crops, hayfields, and short grass prairie. Last identified on the nearby BBS route in 1980. Possibly occurs in the vicinity of the Project Site. This species has not been detected during any of the BBS conducted at the site
Common Loon *Gavia immer*	Special Concern	A large-bodied aquatic bird, the common loon inhabits medium to large lakes. Nests are build a few feet from the water's edge. This species likely does not breed in the vicinity of the Project, but was detected during the 2015 spring raptor migration survey.
Red-Headed woodpecker *Melanerpes erythrocephalus*	Special Concern	Prefers river bottoms, wooded swamps, and open grasslands with trees. Breeding habitat is characterized by the presence of dead trees for nest sites, snags for roosting, and open ground for foraging This species has not been detected during any of the BBS conducted at the site, but there are records in the BBS.
American Bittern *Botaurus Lentiginosus*	Special Concern	A medium-sized, secretive heron that breeds in densely vegetated wetlands. One individual was detected during the 2013 breeding bird survey.
Eastern box turtle *Terrapene carolina*	Special Concern	Found in mixed upland habitats and deciduous woodlands. Frequents wet areas. Some occurrences of this species have been documented in southeastern Chautauqua County. Occurrence in the Project Site is unknown.

Species	NYS Status	Ecology
Wood turtle *Clemmys insculpta*	Special Concern	Often found in wooded wetlands, ponds, and swamps. Will also utilize stream banks for nesting. Records of this species exist for Chautauqua County, and some suitable habitat is likely found within the Project Site. Occurrence within the Project Site is unknown.
Blue-spotted salamander *Ambystoma laterale*	Special Concern	Associated with lowland swamps and marshes and surrounding uplands. Some suitable habitat for this species is located within the Project Site, although occurrence within the Project Site is unknown.
Jefferson salamander *Ambystoma jeffersonianum*	Special Concern	Found in temporary ponds and wetlands (such as vernal pools) in forested areas. There are no records for this species in Chautauqua County, although suitable habitat occurs within the Project Site.
Eastern small-footed myotis *Myotis leibii*	Special Concern	Found in hilly or mountainous areas. Often in deciduous or evergreen forest and open farmland. Warm-season roosts include hollow trees, gaps between tree bark and tree trunks, cliff crevices and some structures. Suitable habitat for this species is found within the Project Site, although no Eastern small-footed myotis were identified during 2015 surveys.
Northern Long-eared Bat *Myotis septentrionalis*	Threatened	In the winter, hibernates in caves and mines with stable temperatures and humidity. During summer, roosts in large trees and snags with fissured bark. Generally prefers mature interior forests although sometimes utilizes trees near canopy gaps. This species has been decimated due to WNS. No suitable hibernaculum caves or mines are known on or near the Project Site. Suitable summer roost tree habitat present on Project Site. One call of this species was detected during 2015 surveys.

No federally listed species were observed during avian surveys conducted since preparation of the DEIS. One species classified as New York State Endangered, the golden eagle, was detected by WEST since the preparation of the DEIS (Table 16). Furthermore, several bald eagles and northern harriers, classified as New York State Threatened, were observed during surveys conducted since preparation of the DEIS (Table 16).

Table 16. Avian species of special concern identified in studies conducted since the preparation of the DEIS.

Species	Status*	Bald Eagle Surveys		Broadcast Call Surveys	Breeding Bird Surveys		Spring Raptor Migration Surveys[1]	Winter Grassland Raptor Surveys	Total
		2013	2015	2013	2013	2015	2015	2015	
Golden Eagle	SE						5		5
Bald Eagle	ST	1	6				22		29
Northern Harrier	ST		4				9		13
Red-shouldered Hawk	SSC		7	13			13		33
Cooper's Hawk	SSC					1	15		16
Sharp-shinned Hawk	SSC	3	2				6	1	12
Osprey	SSC						7		7
Common Loon	SSC						2		2
Cerulean Warbler	SSC				2	1			3
American Bittern	SSC				1				1

* SE = NY State Endangered, ST = NY State Threatened, SSC = NY Species of Special Concern
[1] Some of these observations were of birds outside the Project area.

With respect to federally listed non-avian threatened and endangered species, the USFWS IPaC system identified two endangered species and two threatened species as potentially occurring within the Project vicinity. The two endangered species are clams: the clubshell (*Pleurobema clava*) and the rayed bean (*Villosa fabalis*). The IPaC also identified the bog turtle (*Clemmys muhlenbergii*) and the northern long-eared Bat (*Myotis septentrionalis*) as federally threatened species potentially occurring within the Project vicinity.

2.3.1.5 Other Sensitive Wildlife Resources

Sensitive wildlife resources observed in the Project Site prior to conducting the 2013 and 2015 studies are as described in Section 2.3.1.5 of the DEIS. During avian studies conducted since preparation of the DEIS, additional observations of species of special concern were made as summarized above in Table 16.

Section 2.3.1.5 of the DEIS identified birds listed in the USFWS *Birds of Conservation Concern* (BCC) 2002 that could occur within the Project Site. However, because this publication was updated in 2008 (USFWS, 2008), a revised list is presented below. The proposed Project is located in the Lower Great Lakes/St. Lawrence Plain Bird Conservation Region. The discussion of the black-billed cuckoo (*Coccyzus erythropthalmus*) and the Canada warbler (*Wilsonia Canadensis*) provided in Section 2.3.1.5 of the DEIS remains relevant. However, the bobolink (*Dolichonyx oryzivorus*), which was also discussed in Section 2.3.1.5 of the DEIS has been removed from the USFWS Birds of Conservation Concern List. Additionally, the wood thrush (*Hylocichla mustelina*) and the blue-winged warbler (*Vermivora cyanoptera*), were on the BCC 2008 list and also identified in BBA blocks encompassing the Project site.

The discussion regarding wildlife management areas and game species within the Project site provided in Section 2.3.1.5 of the DEIS remains relevant. Both the CCWMA and the Boutwell Hill State forest are in the vicinity of the southern boundary of the Project Site.

The discussion of fish hatcheries and private fishing reserves in the vicinity of the Project site provided in Section 2.3.1.5 of the DEIS remains relevant; the hatcheries and preserves identified in Figure 2.3-2 of the DEIS are all still in operation, but are located outside of the Project Site.

2.3.2 Anticipated Impacts

2.3.2.1 Construction

Potential construction-related impacts to wildlife and wildlife habitat (including birds and bats, fish and wildlife, and threatened and endangered species) are generally as described in Section 2.3.2.1 of the DEIS. In the SEIS2 Project layout, three wind turbine locations are proposed adjacent to or within areas considered optimal grassland habitat for sensitive grassland bird species (Turbines 110, 103, and 49). This represents a reduction in impacts when compared to the layout presented in the SEIS, from which five turbines were identified as being adjacent to or within optimal grassland habitat. Construction of turbines at these locations may result in some loss of grassland habitat not discussed in the DEIS. Minimizing the size of construction areas around turbines and roads within the areas of grassland habitat will reduce the overall loss of potential habitat for the target species.

Vegetation

Based on the revised Project layout, Project construction is now anticipated to affect 598.2 acres of vegetation, including active agricultural lands and other disturbed communities. Within the Project site (including the 36 proposed turbines as well as the two alternates), natural communities including forests, successional shrublands, open water, and successional old fields account for about 461.8 acres (77%) of this disturbance while agriculture accounts for about 128.5 acres (21%) of total disturbance. A small portion, about 8 acres (2%), is disturbance to ecological communities that are already disturbed or developed (e.g., existing yards and roads). Approximately 528.5 acres (88%) of construction impacts are temporary, as the affected areas will be allowed to revegetate to their pre-existing condition following completion of construction. The remaining 69.5 acres (12%) of impact will result in permanent loss or conversion of the affected community. Permanent impacts to vegetation are discussed in Section 2.3.2.2 of this SEIS2. Impacts to wetland communities are addressed in Section 2.2.2 of this SEIS2.

Table 17. Approximate Area of Disturbance by Vegetation Type

	Temporary Impact		Permanent Impact		Total	
Land Use Class	Acres	%Cover*	Acres	%Cover*	Acres	%Cover*
Active Agriculture	116	22	12.5	18	128.5	21.4
Disturbed/Developed	7.2	1.4	0.8	1.5	8.0	1.3
Forested	391.2	74	53.6	77.1	444.3	74.3
Successional Shrubland/Old Field	13.8	2.6	2.8	4	16.5	2.7
Open Water	0.4	<1	0	0	0.4	<1
Total	528.5	100	69.5	100	598.2	100

*Due to independent rounding, values may not add up to exactly 100.

Wildlife and Terrestrial Habitat

Anticipated impacts to fish and wildlife resulting from Project construction remain generally as described in the DEIS. The Project has been sited to utilize degraded and disturbed areas where possible so as to minimize direct impacts to fish and wildlife or their habitat. However, some level of wildlife displacement, incidental mortality, habitat loss and fragmentation, and degradation of aquatic habitats due to siltation are unavoidable. Most individuals will be able to disperse to nearby non-disturbed areas within the Project site and return to the area following construction. The wildlife species that will experience these impacts are for the most part common species that occur throughout New York State.

Birds and Bats

Anticipated impacts to bird and bat species resulting from Project construction remain generally as described in the DEIS. It is not expected that any construction-related activity will significantly impact local populations of any resident or migratory bird and bat species. Furthermore, all tree clearing that will be required for Project construction will be conducted during the winter, which will avoid or minimize impacts to roosting bats and nesting birds.

Indirect impacts to bird and bat species resulting from Project construction are also generally as described in the DEIS. Any displaced species are expected to disperse to suitable habitats that occur adjacent to the Project. Furthermore, construction-related disturbance is consistent with current agricultural practices, such as plowing and land clearing, which occur regularly within the vicinity of the Project.

Fish, Reptiles, and Amphibians

Anticipated impacts to fish, reptiles, and amphibians resulting from Project construction remain generally as described in the DEIS. Siltation and warmer water from increased solar radiation following vegetation loss are possible impacts to aquatic habitats. However, these impacts will generally be minor and of short-term duration. Boring under streams and crossing with overhead collections lines are two strategies proposed by the Applicant to further avoid stream and wetland impacts. A total of 1,464.08 linear feet of stream will be permanently impacted by Project construction and operation.

Threatened and Endangered Species

Impacts to threatened and endangered species resulting from Project construction remain generally as described in the DEIS. With respect to birds, the listed avian species identified above in Section 2.3.1.4 of this SEIS2 have differing habitat preferences ranging from open grassland (short-eared owl, northern harrier, Henslow's sparrow, grasshopper sparrow, and vesper sparrow), forested (Cooper's hawk, sharp-shinned hawk, red-shouldered hawk, and bald eagle), emergent wetland (great blue heron, northern harrier), and open water (great blue heron, and bald eagle). The northern long-eared bat, a forest dwelling species, was detected in the Project area but in very low numbers (see Appendix H). Project construction is anticipated to occur in close proximity of all of these habitat types, and impacts to these species are therefore possible. Potential impacts could include mortality to eggs and young, avoidance, displacement and disturbance due to noise, and direct habitat loss. Minimizing impacts to grasslands, forests, wetlands, and open water will minimize potential impacts to these species and their habitats. Cutting trees during the winter months will avoid direct impacts to roosting northern long-eared bats and forest nesting birds.

2.3.2.2 Operation

Vegetation

Development of the Project would result in the permanent conversion of up to 69.5 acres of vegetated lands to developed Project components, such as access roads, turbines and turbine pads, crane pads, and a substation. Within the Project site (which includes the 36 proposed turbines as well as the two alternates), natural communities including forests, open water, successional shrublands and old field habitats account for about 56.4 acres (81%) of this loss, while agricultural lands account for about 12.5 acres (18%) of total vegetation loss. Furthermore, up to an additional 196.1 acres of forest communities will be converted to early successional communities for the life of the operating Project. This includes the areas around the turbine foundations and under the proposed generator lead line. Development of the Project and the two alternate turbines would also result in permanent loss of 5.78 acres of wetlands, which is discussed in greater detail in Section 2.2.2 of this SEIS2. Other than minor disturbances to vegetation as a result of routine maintenance and occasional repairs, impacts to vegetation associated with the actual operation of the Project will be limited. Turbine sites, access road embankments, and collection line routes will be maintained in low-growing vegetation (successional or active agriculture). The application of herbicides or pesticides is not anticipated, other than within the fenced substation enclosure.

Fish and Wildlife

As discussed in Section 2.3.2.2 of the DEIS, the Project has been sited to minimize impacts to fish and wildlife by avoiding high quality habitats, such as forests and wetlands, where possible. However, some impacts to wildlife are likely due to collision with turbines, loss of habitat, habitat fragmentation, and displacement due to disturbance caused by presence of operating wind turbines and occasional maintenance and repair. These impacts are as described in Section 2.3.2.2 of the DEIS, with the exception that operation of the revised Project with 36 turbines and the two alternate turbines would result in permanent loss of 56.4 acres of wildlife habitat, including 53.6 acres of forest and 2.8 acres of successional shrublands and old field (see Table 17). Active agricultural lands, which generally have limited wildlife habitat value, would experience 12.5 acres of permanent loss. Impacts to wildlife from forest fragmentation and displacement/disturbance are as described in Section 2.3.2.2 of the DEIS.

Birds

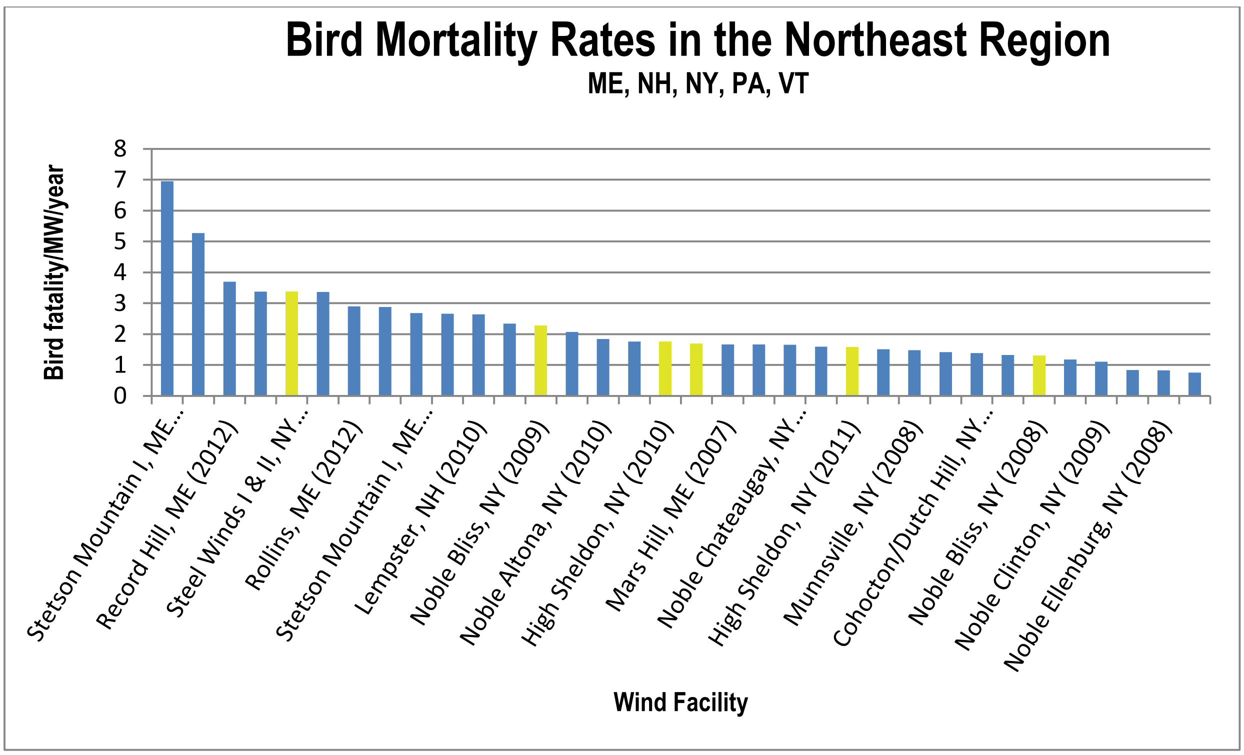
Since the preparation of the DEIS and SEIS, there have been additional studies of operational wind projects in the Northeastern U.S. that provide helpful data for assessing potential impacts from proposed projects. While much of the assessment related to potential bird impacts from the proposed project from the DEIS and SEIS remain accurate, additional information has become available for a number of wind projects in the Northeast region and within the immediate vicinity of Arkwright Summit (Tables 18 and 19 below). Results from operational (post-construction) monitoring studies at nearby wind projects suggest that impacts to birds would fall between on average approximately 1 and 3 birds per MW per year (Table 18 below). Given that the Arkwright Summit Wind Project will have an operating capacity of 78.6 MW, mortality rates of 79 to 236 birds per year could occur from Project operation. The existing wind projects that are near the Arkwright summit site have generally seen average impacts to birds based on comparison with studies throughout the northeast region (Table 19, Graph 1).

Recent studies looking at the effects of wind turbine caused mortality on a cumulative basis, regionally and nationally, on passerines shows that this level of mortality does not have a significant effect on songbird populations (Erickson et al. 2014). Small passerines are the most abundant bird group in the U.S. and Canada, as well as the most common bird fatalities from turbine collisions at wind energy facilities (Erickson et al. 2014). Erickson et al. (2014) developed bias corrected standardized songbird fatality rates from over 110 studies across the continental U.S. and Canada. Using species composition information from those studies, and estimates of cumulative mortality from all wind energy projects in the U.S. and Canada, it was concluded that wind turbine-caused mortality had no measurable impact on any small passerine species populations. A similar approach was also used to look at potential impacts of wind energy on a regional scale in the Northeast (Erickson et al. 2015). Using the fatality rates from wind energy reported in the region, the impacts to small passerine populations in Bird Conservation Region (BCR) 14 were evaluated. BCR 14 is the Atlantic Northern Forest region and covers all of Maine, New Brunswick, and Nova Scotia, contains parts of New Hampshire, Vermont, and Quebec, and the Adirondack Mountains in New York. Using the estimator bias adjusted fatality rates, regional estimates of small bird fatalities were approximately 2500 to 3500 birds per year. Similar to the national estimates, the regional impact of mortality due to collisions with current level of wind energy development on bird populations was extremely low relative to the size of the BCR 14 bird populations. Most of these species are migratory and may reside in areas outside BCR 14, so this analysis is likely an overestimate of the potential for population effects because only the resident population within BCR 14 was included. The highest impact was an estimated 0.06% of the northern mockingbird (*Mimus polyglottos*) population (five fatalities in a population of 9,000). Prairie warblers (*Setophaga discolor*) and yellow-throated vireos (*Vireo flavifrons*) had an estimated impact to 0.03% of the population (five fatalities in populations estimated at 16,000), and pine warblers (*S. pinus*) had an estimated impact to 0.03% of the population (49 fatalities in a population estimate of 180,000). All other species impacted in the region were less than 0.01% of the population. Red-eyed vireos (*V. olivaceus*) had an estimated impact to 0.006% of the population (689 fatalities in a population of 12,000,000).

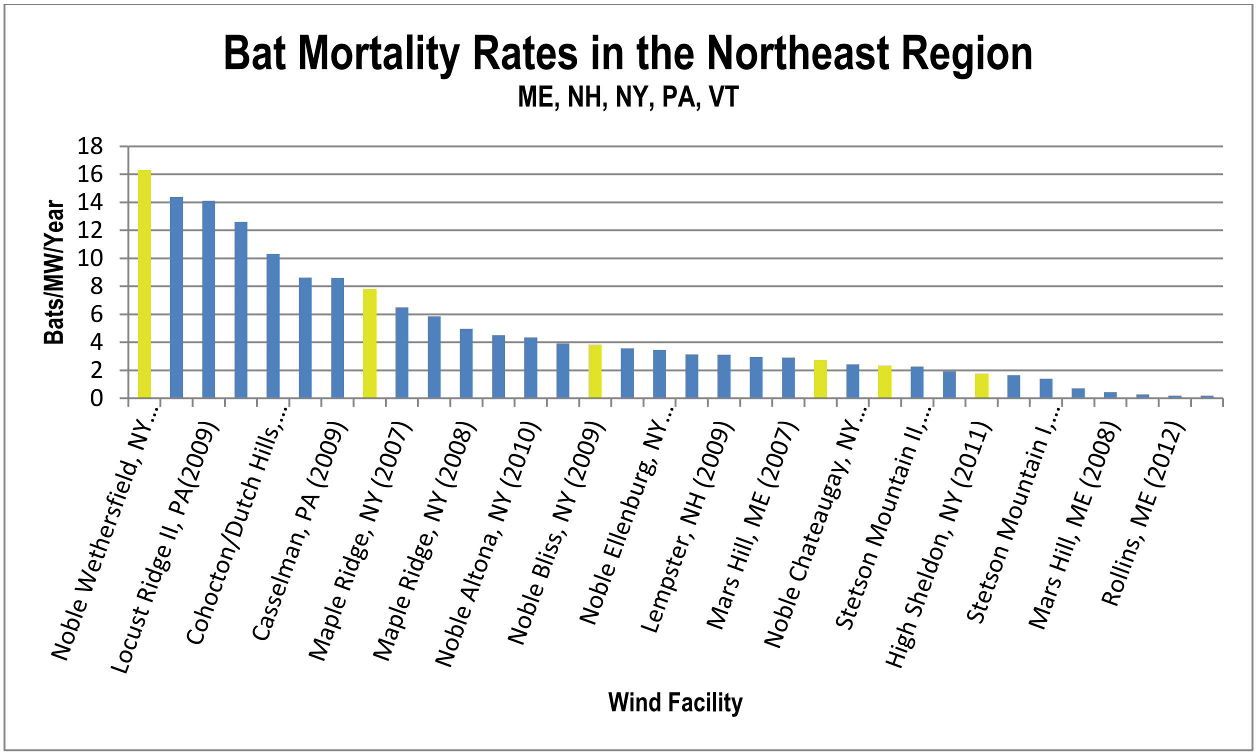
Fatality estimates for raptor species have been developed as well, taxa that have received more scrutiny relative to wind energy (Erickson et al. 2015). Using similar methods to those used in Erickson et al. (2014), it was determined that sharp-shinned hawk (*Accipiter striatus*) and red-tailed hawk (*Buteo jamaicensis*) were the raptor species affected most: approximtely 0.2 to 0.3% of their populations suffer annual mortality from collisions with wind turbines in the U.S. and Canada. Impact estimates for all other raptor species were less than 0.2%. While these ratios of fatality estimates to population sizes are higher than for the small passerines, they are still quite low relative to the overall population size and typical annual mortality for raptor populations.

Bats

Since the preparation of the DEIS and SEIS, there have been additional studies of operational wind projects in the Northeastern U.S. that provide helpful data for assessing potential impacts from proposed projects. While much of the assessment related to potential bat impacts from the proposed project from the DEIS and SEIS remains accurate, new information suggests that the best predictor of potential impacts to bats results from nearby or regional wind projects. Results from operational (post-construction) monitoring studies at nearby wind projects suggest that impacts to bats would fall between on average approximately 2 and 8 bats per MW per year (Table 18). Given that the Arkwright Summit Wind Project will have an operating capacity of 78.6 MW, mortality rates of 157 to 629 bats per year could occur from Project operation. The existing wind projects that are near the Arkwright site have generally seen variable impacts to bats based on comparison with studies throughout the northeast region (Table 19, Graph 2).



Graph 1. Bird mortality rates for wind projects in Northeastern U.S. Yellow bars indicate facilities within 50 miles of the Arkwright Summit Wind Project.



Graph 2. Bat mortality rates for wind projects in Northeastern U.S. Yellow bars indicate facilities within 50 miles of the Arkwright Summit site.

Table 18. Bird and Bat Morality Rates at wind facilities within 50 miles of the proposed Arkwright Wind Farm.

Wind Facility	Bat Fatality/MW/Year	Bird Fatality/MW/Year	Reference
High Sheldon, NY (2010)	2.33	1.76	Tidhar et al. 2012
High Sheldon, NY (2011)	1.78	1.57	Tidhar et al. 2012
Noble Bliss, NY (2008)	7.80	1.30	Jain et al. 2009
Noble Bliss, NY (2009)	3.85	2.28	Jain et al. 2010a
Noble Wethersfield, NY (2010)	16.30	1.70	Jain et al. 2011c
Steel Winds I & II, NY (2012)[1]	2.75	3.38	Stantec Ltd. 2013
Mean	5.80	2.00	

[1]Study only included 7 months over the 9-month period of March-November

Table 19. Bird and Bat Morality Rates at wind facilities in Maine, New Hampshire, New York, and Pennsylvania.

Wind Facility	Bird Fatality/MW/Year	Bat Fatality/MW/Year	Reference
Casselman, PA (2008)	1.51	12.61	Arnett et al. 2009
Casselman, PA (2009)	2.88	8.6	Arnett et al. 2010
Cohocton/Dutch Hill, NY (2009)	1.39	8.62	Stantec 2010

Cohocton/Dutch Hills, NY (2010)	1.32	10.32	Stantec 2011
Lempster, NH (2009)	2.64	3.11	Tidhar et al. 2010
Lempster, NH (2010)	3.38	3.57	Tidhar et al. 2011
Locust Ridge II, PA (2009)	0.84	14.11	Arnett et al. 2010
Locust Ridge II, PA (2010)	0.76	14.38	Arnett et al. 2010
Maple Ridge, NY (2007)	2.34	6.49	Jain et al. 2009a
Maple Ridge, NY (2008)	2.07	4.96	Jain et. al 2009d
Marble River, NY (2014)	1.67	0.71	Bay et. al 2015
Mars Hill, ME (2007)	1.67	2.91	Stantec 2008b
Mars Hill,ME (2008)	1.76	0.45	Stantec 2009
Munnsville, NY (2008)	1.48	1.93	Stantec 2009
Noble Altona, NY (2010)	1.84	4.34	Jain et al. 2011a
Noble Bliss,NY (2008)	1.3	7.8	Jain et al. 2009
Noble Bliss,NY (2009)	2.28	3.85	Jain et al. 2010a
Noble Chateaugay,NY (2010)	1.66	2.44	Jain et al. 2011b
Noble Clinton,NY (2008)	1.59	3.14	Jain et al. 2009
Noble Clinton,NY (2009)	1.11	4.5	Jain et al. 2010b
Noble Ellenburg,NY (2008)	0.83	3.46	Jain et al. 2009
Noble Ellenburg,NY (2009)	2.66	3.91	Jain et al. 2010c
Noble Wethersfield,NY (2010)	1.7	16.3	Jain et al. 2011c
Record Hill,ME (2012)	3.70	2.96	Stantec 2013
Rollins,ME (2012)	2.90	0.18	Stantec 2013
Sheffield, VT (2012)	5.27	5.86	Martin et al. 2013
Sheldon,NY (2010)	1.76	2.33	Tidhar et al. 2012
Sheldon,NY (2011)	1.57	1.78	Tidhar et al. 2012
Stetson Mountain I,ME (2009)	2.68	1.40	Stantec 2009
Stetson Mountain I, ME (2011)	1.18	0.28	Normandeau Associates 2011
Stetson Mountain I,ME (2013)	6.95	0.18	Stantec 2014
Stetson Mountain II,ME (2010)	1.42	1.65	Normandeau Associates 2010
Stetson Mountain II,ME (2012)	3.37	2.27	Stantec Consulting 2013
Mean	2.17	4.89	

Threatened and Endangered Species

Anticipated impacts to threatened and endangered species resulting from Project operation are generally as described in Section 2.3.2.2 of the DEIS. In addition to the avian species identified in the DEIS, subsequent studies conducted by WEST also detected the presence of the golden eagle, osprey, common loon, cerulean warbler, and American bittern within the Project Site although in very low numbers and in some cases only as migrants moving though the area. However, of these species, only golden eagle is listed as threatened by New York State.

The northern long-eared bat, which is listed as threatened by both New York State and the USFWS, was identified by the NYSNHP as occurring within 40 miles of the Project. Through acoustic and mist-netting surveys conducted in 2015, one call of northern long-eared bat was identified within the Project site indicating that the species may be present but in very numbers. Given that the density of northern long-eared bats in the project is very low, no impacts to the species are anticipated as a result of Project operation.

2.3.3 Proposed Mitigation

2.3.3.1 Vegetation

Proposed mitigation for impacts to vegetation resulting from Project construction and operation are generally as described in Section 2.3.3.1 of the DEIS. The Project has been designed to avoid impacts to sensitive ecological communities such as wetlands and mature forest to the greatest extent practicable. Additionally, the Applicant will develop and implement comprehensive sediment and erosion control plans, as well as a Stormwater Pollution Prevention Plan (SWPPP), to reduce the potential indirect effects of sedimentation and erosion resulting from the loss of vegetation and ground disturbance. The SWPPP that was prepared for EDPR's Marble River Project is attached to this SEIS2 as Appendix G. The Marble River SWPPP is substantially similar to the one that will be prepared for the Arkwright Summit Wind Project.

The Applicant will also implement an invasive species/noxious weed control plan (Appendix I) to reduce the potential introduction and spread of invasive species throughout the Project. Throughout the life of the Project, periodic vegetation management will be conducted along collection line corridors, road shoulders, and turbine sites. Clearing would be conducted after October 1 and before April 1 unless otherwise approved by NYSDEC and USFWS in order to minimize impact to breeding birds, bats and small mammals in these areas. No pesticides or herbicides would be applied during this clearing.

2.3.3.2 Fish and Wildlife

As discussed in Section 2.3.3.2 of the DEIS, the Project has been designed to avoid disturbance to fish and wildlife and their preferred habitats to the extent practicable. The mitigation measures described in Section 2.3.3.2 of the DEIS, including employment of an environmental inspector during construction and restoration of disturbed areas, adhering to the SWPPP (Appendix G), and SPCC (Spill Prevention, Containment, and Countermeasure) plans remain accurate. The SPCC Plan that was prepared for EDPR's Marble River Project is attached to this SEIS2 as Appendix F. The Marble River SPCC Plan is substantially similar to the one that will be prepared for the Arkwright Summit Wind Project and included in the FEIS.

Furthermore, construction employees will receive environmental training that emphasizes mitigation measured to be implemented during all phases of construction. With respect to avian and bat species, the Applicant will fund an operational (post-construction) monitoring program to estimate impacts of the wind farm on birds and bats. A monitoring plan will include specific information regarding planned mortality searches for birds and bats within the Project Site, and proposed study methodology and candidate mortality search sites. In addition, the monitoring plan will include post-construction breeding bird surveys along the same transects used prior to construction so that potential displacement effects can be measured. Once all surveys are completed, the Applicant will consult with the USFWS to determine mitigation measures appropriate for addressing potential impacts to eagles and other species bird and bat species.

2.4 CLIMATE AND AIR QUALITY

2.4.1 Existing Conditions

2.4.1.1 Climatic Conditions

Due to the quantity of time that has elapsed from the preparation of the DEIS to the present, we have reviewed and updated the climatic conditions that were presented in Section 2.4.1.1 of the DEIS. The U.S. National Climatic Data Center (NCDC) maintains climate data for numerous weather measurement station locations throughout the United States, including data collected at nearby Fredonia, New York, which is located approximately 6 miles northwest of the Project Site. The NCDC data for Fredonia is representative of the Project Area and includes normal value averages for the measurement period 1981 through 2010. Based on these 30-year averages, the average annual mean temperature is 50.2°F, average annual daily maximum temperature is 58.5°F, and the average annual daily minimum temperature is 41.9°F. Historically, January is the coldest month with an average daily temperature of 27.0°F, and July is the warmest month with an average daily temperature of 71.6°F (NCDC 2015). The 30-year average precipitation recorded in Fredonia is 41.93 inches per year. September is historically the wettest month of the year, with an average precipitation of 4.50 inches, while February is historically the driest, with an average of 2.13 inches (NCDC 2015). The average annual snowfall for Chautauqua County (recorded in Fredonia) is 82.7 inches. Historically, January is the snowiest month with 24.4 inches on average.

2.4.1.2 Air Quality

Since the release of the SEIS, an updated air quality data report for New York State has been published by the NYSDEC Division of Air Resources. The most recent summary of air quality data available for the state is the *New York State Ambient Air Quality Report for 2013: 2013 Data Tables* (NYSDEC, 2014). Along with the most recent ambient air quality data, this report also includes 10-year annual air quality trends derived from data collected from various monitoring stations across the state. These data are organized by NYSDEC region (the Project Site is located in NYSDEC Region 9). Air quality sampling points for Region 9 occur in the Towns of Dunkirk and Westfield in Chautauqua County, the City of Buffalo and the Towns of Tonawanda and Amherst in Erie County, and the Towns of Niagara Falls and Middleport in Niagara County. Data collected from these sampling points were within the acceptable levels established by the National Ambient Air Quality Standards (NAAQS) for sulfur dioxide, inhalable particulates, and ozone level.

2.4.1.2.1 Conventional Power Plants and Air Pollution

Despite recent developments in clean and renewable energy, conventional power plants still comprise the majority of the United States' energy generation. As of 2014, fossil fuel combustion was responsible for about 66% of total electricity generation, while wind energy was only around 4%. Of the fossil fuels used for electricity generation, coal is still the most prevalent, representing about 58% of overall fossil fuel combustion (USEIA, 2015b).

There have been some reductions in SO_2 and NO_x emissions by coal combustion since publication of the DEIS. Much of the reduction has been due to regulations imposed by the EPA for coal emissions, first under the Clean Air Interstate Rule (CAIR) of 2005 and later under the Cross-State Air Pollution Rule (CSAPR) of 2011. These regulations were passed in order to reduce emissions that contribute to ozone and fine particle pollution, which negatively impact human health. The target of CSAPR is to reduce SO_2 and NO_x emissions by 73% and 54%, respectively (EPA, 2011). Despite these reductions, the coal industry is still a major polluter and adverse impacts to human health from air pollution are well documented (Burt et al., 2013).

Climate change, and the significance of human influence on climate change, have become more certain since release of the DEIS. State, federal, and international agencies agree that the scientific evidence for the existence of climate change is unambiguous and that society will experience adverse impacts from it. The NYSDEC determined that "air and water quality, forests, fish and wildlife habitats, and people and communities, are at risk from climate change" (NYSDEC 2015). In the Commissioner's Policy on Climate Change and DEC Action, NYSDEC outlined a strategy containing climate change mitigation objectives, including curbing greenhouse gas emissions, so that New York can play its part in reducing the severity of global warming (NYSDEC, 2015a). On an international level, the Intergovernmental Panel on Climate Change (IPCC), a consortium of experts on climate change from around the world, agree that "Continued emission of greenhouse gases will cause further warming and long-lasting changes in all components of the climate system, increasing the likelihood of severe, pervasive and irreversible impacts for people and ecosystems" (IPCC, 2014). Fossil fuel-based energy production has played a major part in causing global warming. Electricity generation from coal and natural gas is responsible for about one third of all greenhouse gas emissions in the U.S., so moving toward renewable energy technologies in the energy industry represents one important way to mitigate climate change. Although efforts have been made to reduce greenhouse gas emissions, current levels are about six percent higher than they were in 1990 (EPA, 2015b).

2.4.2 Potential Impacts

2.4.2.1 Construction

Impacts to air quality with respect to Project construction are as described in section 2.4.2.1 of the DEIS.

2.4.2.2 Operation

The operating Project will generate up to 78.6 MW of electricity without any fossil-fuel emissions. As discussed in Section 1.1 of the SEIS2, the Project is expected to have an average annual net capacity factor (NCF) of approximately 33%. Therefore, the total net electricity delivered to the existing New York power grid is expected to be approximately 227,217 megawatt hours (MWh) (i.e., ((33 turbines x 2.2 MW) + (3 turbines x 2.0 MW)) x 24 hours/day x 365 days x 33%), or enough electricity to meet the average annual consumption of between approximately 20,846 and 31,558 households (based on average annual electric consumption of 10.9 MWh for the U.S and 7.2 MWh for New York; Energy Information Administration [USEIA], 2015a). Power delivered to the grid from this Project will directly offset the generation of energy at existing conventional power plants. An emissions calculator provided on the Abraxas Energy Consulting website utilizes average emissions by state (calculated in a 2004 federal study by the Leonardo Academy) as a basis to calculate project-specific emissions of a number of pollutants (Abraxas Energy Consulting, 2009; Leonardo Academy, 2004). Based on emission rates for electricity generation in New York State, the Project (with a 33% capacity factor) is estimated to annually displace:

- 159 tons of NO_x
- 420 tons of SO_2

- 117,700 tons of CO_2
- 5.7 pounds of Mercury
- 1,289 tons of Mercury compounds

These values are lower than those reported in the SEIS, which utilized a model developed by Resource Systems Group (RSG) that matched expected hourly generation of the Project with the hourly generation of variably dispatched fossil fuel units at selected regional power plants. However, this decrease in emissions displacement is consistent with the reduction in the electrical output of the Project from 79.8 MW reported in the SEIS to 78.6 MW associated with the Project set forth in this SEIS2.

As described in the DEIS, Section 2.4.2.2, the operation of this Project is anticipated to result in indirect positive impacts on air quality. Furthermore, as mentioned previously, climate change will have adverse effects for people and ecosystems, and New York State has implemented initiatives that curb greenhouse gas emissions, with the goal of reducing the severity of climate change in the future. The Renewable Portfolio Standard (RPS, NYSERDA 2015) set a target of a 30% reduction in greenhouse gas emissions by 2015. This program is divided into tiers, with the Main Tier being those greenhouse gas sources that are from large scale energy producers, such as wind farms and coal power plants. As of 2014, Main Tier emissions reductions were only at 53% of the target; there is clearly still a need for more clean, renewable energy. By displacing approximately 117,700 tons of CO_2 annually, the Project will contribute to goals set by New York State for greenhouse gas emissions and will ultimately have a small, positive impact on reducing the severity of climate change.

2.4.3 Proposed Mitigation

Except for minor, short-term impacts from construction vehicles, the Project will have no adverse impacts on air quality. Please see Section 2.4.3 of the DEIS for proposed mitigation, which includes implementation of a Dust Control Plan and proper vehicle maintenance. Overall, the Project will have a significant long-term beneficial impact on climate and air quality. This benefit can be viewed as mitigation for other environmental impacts associated with the Project.

2.5 AESTHETIC AND VISUAL RESOURCES

The purpose of this section is to evaluate the visual impact of the SEIS2 Project Layout relative to the evaluation of the Project's visual impacts as presented in the SEIS and DEIS. To support this analysis, a Second Supplemental Visual Resource Assessment (SVRA2) and Shadow Flicker Report for the SEIS2 Project layout have been prepared and are appended to the SEIS2 (Appendices J and K, respectively). The DEIS included an initial Visual Resource Assessment (VRA; Saratoga Associates, 2008) and the SEIS included a Supplemental Visual Resource Assessment (SVRA; Saratoga Associates, 2009). Changes in the SEIS2 Project Layout that affect potential visual impacts include the reduced number of proposed turbines from 44 to 36 (plus two alternate turbine locations, which were conservatively included in the assessment of visual impacts), the increase in turbine height, the elimination of turbines and overhead collection lines in the southeastern portion of the Project Site, and the reduced number of proposed turbines to be lit with FAA warning lights.

2.5.1 Existing Conditions

2.5.1.1 Viewshed Area

The study area evaluated in the SVRA2 (the SVRA2 Study Area) is defined as the area within 5 miles of proposed wind turbines in the SEIS2 Project Layout and includes 138.3 square miles (see SEIS2 Figures 13 and 14). Due to the reduced number of wind turbines in the SEIS2 Project layout, the viewshed area is reduced from 161.0 square miles, which was the visual study area evaluated in the DEIS and the SEIS.

2.5.1.2 Sensitive Receptors

Conditions are generally as described in the DEIS/SEIS with regards to visually sensitive resources found within the study area (Figure 13). However, the inventory has been expanded to include Lake Erie Concord Grape Belt New York State Heritage Area (a resource of statewide significance according to the NYSDEC visual policy) and the following locally important resources:

- 2 schools (Central Christian Academy and Forestville Elementary [formerly included as Forestville School Complex]);
- 3 trails (Earl Cardot Eastside Overland Trail and associated Lean-To, Cherry Creek Sno-Goers Trail, and Bits-N-Spurs Trail);
- 2 local parks (Barker Commons and Washington Park);
- 2 hamlets (Cardova and Lily Dale);
- 13 local roads and 2 state routes (Route 428 and Route 424)
- 18 cemeteries; and
- 28 named lakes, streams, and waterfalls.

Furthermore, a few of the resources included in the SEIS are no longer included as they now fall outside of the 5-mile visual study area. These resources include 3 hamlets (Charlotte Center, Balcom Corners and Balcom); Pine Valley Central School; and 3 local roads. The Dunkirk US Post Office, listed on the National Register of Historic Places, is also now located outside of the visual study area but has been retained in the inventory due to its statewide significance. A table of all inventoried visually sensitive resources including updated viewshed visibility results is included in Appendix A of the SVRA2 (i.e., SEIS2 Appendix J).

2.5.1.3 Assessment of Shadow Flicker

An updated shadow flicker analysis was prepared for the SEIS2 (see Appendix K). The analysis was prepared in accordance with the methods and assumptions outlined the DEIS and the SEIS. Shadow flicker refers to the moving shadows that an operating wind turbine casts over an identified receptor at times of the day when the turbine rotor is between the sun and a receptor's position. Shadow flicker is most pronounced in northern latitudes during winter months because of the lower angle of the sun in the winter sky. However, it is possible to encounter shadow flicker anywhere for brief periods before sunset and after sunrise (U.S. Department of the Interior, 2005). During intervals of sunshine, wind turbine generators will cast a shadow on surrounding areas as the rotor blades pass in front of the sun, causing a flickering effect while the rotor is in motion. Shadow flicker does not occur when fog or clouds obscure the sun, or when turbines are not operating.

The distance between a wind turbine and a potential shadow-flicker receptor affects the intensity of the shadows cast by the blades, and therefore the intensity of flickering. Shadows cast close to a turbine will be more intense, distinct, and focused. This is because a greater proportion of the sun's disc is intermittently blocked by the turbine (BERR, 2009). Obstacles such as terrain, vegetation, and/or buildings occurring between receptors and wind turbines may significantly reduce or eliminate shadow-flicker effects. At distances beyond roughly 10 rotor diameters, approximately 1,100 meters based on the Vestas V110 turbine model used in this case, shadow-flicker effects are generally considered negligible (BERR, 2009; DECC, 2011).

Prior to conducting the shadow-flicker analysis for the SEIS2, the Applicant identified 206 residential structures (or receptors) within 1,100 meters of proposed turbines (i.e., the shadow flicker study area). Note that the turbines proposed in the DEIS and SEIS Project Layouts featured a 90-meter rotor diameter. Therefore, for the purpose of providing a conservative analysis, the shadow flicker study area in the DEIS and SEIS included all areas within 1,000 meters of the proposed locations of wind turbines at that time. For the DEIS layout, there were 211 receptors, and for the SEIS layout there was 206 receptors, located within 1,000 meters of a proposed turbine.

2.5.2 Anticipated Impacts

2.5.2.1 Construction

Anticipated construction-related impacts are as described in the SEIS.

2.5.2.2 Operational Impacts

2.5.2.2.1 Visual Character

The Project's general impact on the physiographic/visual setting of the study area is generally as described in Section 2.5.2.1 of the DEIS. Due to changes in the SEIS2 Project layout, specifically including the reduced number of proposed turbines and elimination of turbines in the southeastern portion of the Project Site, the Project's potential visual effect on some portions of the study area will be reduced relative to the evaluations presented in the DEIS and SEIS.

2.5.2.2.2 Visibility Analysis

Viewshed Methodology

Viewshed maps define areas of potential Project visibility by identifying areas within the study area that could have an unobstructed line of sight from the viewer to any portion of one or more of the proposed turbines (NYSDEC, not dated). Topographic viewshed maps for the Project were prepared using 10-meter resolution USGS digital elevation model (DEM) data, the location and height of all proposed turbines, and ESRI ArcGIS® software with the Spatial Analyst extension. Two five-mile radius topographic viewsheds were mapped, one to illustrate "worst case" daytime visibility (based on a maximum blade tip height of 492 feet, or 150 meters, above existing grade) and the other to illustrate potential visibility of turbine lights (based on the FAA warning light height of 328 feet, or 100 meters, above existing grade and the anticipated lighting plan, which proposed that eight turbines would be equipped with FAA warning lights). The ArcGIS program defines the viewshed (using topography only) by reading every cell of the DEM data and assigning a value based upon visibility from observation points throughout the study area. The resulting topographic viewshed maps define the maximum area from which any portion of any turbine within the completed Project could potentially be seen within the study area during both daytime and nighttime hours (ignoring the screening effects of existing vegetation and structures).

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

To supplement the topographic viewshed analysis, a vegetation viewshed was also prepared to illustrate the potential screening provided by forest vegetation. A base vegetation layer was created using the 2011 USGS National Land Cover Dataset (NLCD) to identify the mapped location of forestland (including the Deciduous Forest, Evergreen Forest, Mixed Forest, and Woody Wetland NLCD classifications). Based on standard visual assessment practice, the mapped locations of the forest land was assigned an assumed height of 40 feet and added to the DEM. Field review of the study area indicated that much of the tall vegetation is significantly higher than 40 feet, making this assumption a very conservative one. The viewshed analysis was then re-run, as described above. As with the topographic viewshed analysis, two vegetation viewsheds were mapped, one to illustrate “worst case” daytime visibility (based on a maximum blade tip height of 150 meters above existing grade) and the other to illustrate potential visibility of turbine lights (based on an FAA warning light height of 100 meters above existing grade and the anticipated lighting plan, which proposed that eight turbines would be equipped with FAA warning lights). Once the viewshed analysis was completed, the areas covered by the forest vegetation layer were designated as “not visible” on the resulting data layer. Although there are certainly areas of mapped forest that have natural or man-made clearings that provide open outward views, these openings are rare, and the available views would typically be narrow/enclosed and include little of the proposed Project. In most forested areas, views will be well screened by the overhead tree canopy. During the growing season the forest canopy will fully block views of the proposed turbines, and such views will typically be almost completely obscured, or at least significantly screened by tree trunks and branches, even under “leaf-off” conditions.

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

<u>Viewshed Results</u>

The results of the revised viewshed analysis are depicted in Figure 14 and are compared with the results of the SVRA viewshed analyses in Table 20 below. With respect to viewshed results, the most influential differences between the SVRA and SVRA2 turbine layouts include a decrease in the number of turbines proposed from 44 to 36 turbines (plus the 2 alternate turbines that are not anticipated to be built, but have been included in the viewshed analysis); the associated decrease in the size of the 5-mile visual study area from 161.0 square miles to 138.3 square miles, and the increase in maximum blade tip height from 410 feet to 492 feet and increase in FAA warning light height from 275 feet to 328 feet.

Table 20. Blade Tip Viewshed Visibility Comparison

Number of Turbines Visible[1]	Five-Mile-Radius Study Area Blade Tip Viewshed Results[2]							
	Considering Topography Only				Considering Topography and Vegetation			
	SVRA (SEIS Project Layout)		SVRA2 (SEIS2 Project Layout)		SVRA (SEIS Project Layout)		SVRA2 (SEIS2 Project Layout)	
	Square Miles	% of Study Area	Square Miles	% of Study Area	Square Miles	% of Study Area	Square Miles	% of Study Area
0	29.8	18.5	16.9	12.2	120.3	74.7	99.6	72.0
1-5	9.1	5.7	5.8	4.2	7.4	4.6	5.7	4.2
6-10	9.8	6.1	5.9	4.3	6.6	4.1	4.6	3.4
11-15	14.9	9.2	9.8	7.0	6.9	4.3	5.4	3.9
16-20	13.3	8.3	10.8	7.9	6.5	4.0	5.1	3.8
21-30	32.4	20.1	27.6	19.9	8.5	5.3	10.3	7.4
31-40	30.1	18.7	61.4	44.4	3.3	2.0	7.6	5.5
41-44	21.5	13.4	0.0	0.0	1.6	1.0	0.0	0.0
Total Visible	**131.2**	**81.5**	**121.3**	**87.7**	**40.7**	**25.3**	**38.7**	**28.2**

[1] The current layout includes 38 turbines (36 proposed turbines and 2 alternates), and consequently, there are no locations from which 39-44 turbines would be visible. However, to facilitate direct comparison with the impacts presented in the SVRA, the same range of numbers of visible turbines was used.

[2] The SVRA visual study area totaled 161.0 square miles. The SVRA2 visual study area totals 138.3 square miles. Due to rounding to the 10th of a square mile and a 10th of a percentage, the sum of the individual turbine count group categories may not precisely equal the size of the study area or 100%.

As shown in Figure 14, Sheet 1, the SVRA2 blade tip topographic viewshed shows a very similar pattern and extent of potential visibility to the viewshed maps presented in the SVRA. However, due to the increase in turbine height, areas of potential turbine visibility have expanded slightly further down some hillsides and valleys in the northern and western portions of the visual study area, into areas that were formerly outside of the SVRA viewshed. Similarly, many areas that formerly were anticipated to have potential views of 1-5 turbines now may have views of 5-10 turbines and a similar shift has occurred with each of the turbine groups, with an overall expansion of areas from which more than 31 turbines may be potentially visible. Potential turbine visibility has been reduced in some areas within the eastern and southern portions of the visual study area as a result of turbines that have been removed from the layout.

Once the screening effects of mapped forest vegetation are factored into the analysis, Project visibility is significantly reduced and the change in Project visibility between the SVRA and SVRA2 viewshed results is reduced as well. Table 20 shows an overall minor decrease in the percentage of the study area where the turbines are fully screened from view (from 18.5% to 12.2% for the topographic viewshed analysis and from 74.7% to 72.0% when both topography and vegetation are factored into the viewshed analysis) and a minor increase in the percentage of the study area where more than 31 turbines are potentially visible (from 32.1% to 44.4% for the topographic viewshed analysis and from 3.0% to 5.5% for the topographic/vegetation viewshed analysis). It is important to note that these changes in percent visibility are also influenced by the change in the size of the visual study area, which now excludes the southern portion of the SVRA study area that included relatively large areas where views of turbines were fully screened by topography.

2.5.2.2.3 Impacts to Visually Sensitive Resources

The inventory of visually sensitive resources has been expanded from the SEIS, primarily to include cemeteries and named streams, increasing the number of inventoried resources from 77 to 131 (Figure 13). The SEIS2 blade tip vegetation/topography viewshed indicates that 113 of the 131 inventoried resources (approximately 86%) within the visual study area may have a view of one or more proposed wind turbines. Similarly, the SEIS reported that 86% of the 77 inventoried resources may have views of the proposed turbines.

The general discussion regarding impact on visually sensitive resources presented in Section 2.5.2.2.3 of the SEIS remains accurate. However, the SEIS2 Project layout will result in minor changes in anticipated visibility from some visually sensitive resources. Shifts in proposed turbine locations could cause an increase or decrease visibility from individual sites when compared with the SEIS Project Layout, depending on their locational relationship. Additionally, the elimination of some turbines from the layout will reduce visibility from some sites, while the increase in overall turbine height will increase Project visibility from some areas. The inventory of visually sensitive resources and associated mapping provided in Appendix A of the SVRA2 (SEIS2 Appendix J) includes updated information on the anticipated viewshed visibility from each inventoried visually sensitive resource. While most changes that have occurred are subtle, the revised viewshed results indicate that a few resources that were formerly anticipated to be fully screened from view now may have limited Project visibility. These resources include Hillside Acres Preserve, Merritt Estate Winery, the Hamlet of Hawkins Corner, and the Village of Cassadaga.

2.5.2.2.4 Affected Viewers

As described in Section 2.5.2.2.4 of the DEIS, affected viewers within the study area include local residents, commuters, travelers on regional highways, and tourists. The effect on potential views will be highly variable for each of these viewer groups, and depends on factors such as distance, the number of turbines visible, whether the viewer is stationary or moving, duration of view, and attitudes of the viewer towards wind turbines and/or expectations for the rural landscape.

2.5.2.2.5 Photo Simulations

The DEIS included visual simulations from 13 viewpoints and based on comments and feedback received from the SEQRA Lead Agency (the Town of Arkwright), the SEIS included visual simulations from 15 viewpoints (see SEIS2 Figure 16). The simulations presented in the SEIS were prepared to address visual impacts in areas of potential concern as identified by the SEQRA Lead Agency. To evaluate the changes in the potential visual effect of the SEIS2 Project layout relative to the SEIS Project layout, a site visit was conducted on May 6, 2013 to obtain photos from the same 15 viewpoints that were evaluated originally. In total, visual simulations from 17 viewpoints were prepared for inclusion in the SVRA2 (see Table 21). (Note: a detailed description of the process used to prepare the photo simulations is included in the SVRA2, which is included as SEIS2 Appendix J). The viewpoints for which simulations were prepared include 14 of the viewpoints for which simulations were prepared in the SVRA (Viewpoints S1-S13 and S15), as well as three additional views to capture the generator lead line and other visually sensitive resources (see Figure 17). Figures 16 and 17 of the SEIS2 (see also SEIS2 Appendix J) provide the complete simulations for these locations.

Table 21. Viewpoints Selected for Visual Simulations

Viewpoint	Visually Sensitive Resource or Landscape Context	Viewing Distance (miles)	View Orientation[1]
S1	NYS Route 83 and Center Road	0.3	NNW
S2	Straight Road and Center Road	0.4	SW, SE
S3	Arkwright Town Hall	0.3	SSW
S4	Arkwright Hills Campground (Entrance from NYS Route 83)	0.5	NNE
S5	Meadows Road and NYS Route 83	0.5	WSW, SW
S6	Meadows Road and Center Road	0.5	ENE
S7	Ruttenburg Road and Farrington Hollow Road	0.4	SSE
S8	Ruttenburg Road and Rood Road	2.1	NE, ENE, E
S9	Ball Road and Center Road	0.3	ESE, SE
S10	Weaver Road and Center Road	0.4	SSW
S11	Corner of Cable Road and Miller Road	0.9	ENE
S12	Straight Road	1.8	WNW, WSW, SSW
S13	Ball Road	0.3	ENE, NNE, ESE
S14-alt	Skinner Road (view of proposed Generator Lead)	0.1	SE-E

Viewpoint	Visually Sensitive Resource or Landscape Context	Viewing Distance (miles)	View Orientation[1]
S15	NYS Route 83 (view of proposed Generator Lead)	1.0	ENE
16	Dunkirk Lighthouse (note: additional simulation not included in SVRA)	6.5	SE
17	Lake Erie/Dunkirk Marina (note: additional simulation not included in SVRA)	5.6	SE

[1]N = North, S = South, E = East, W = West

A comparison of the visual simulations for the SEIS and SEIS2 Project layouts from each viewpoint is presented in SEIS2 Figure 16. This comparison of the visual simulations for the SEIS and SEIS2 Project layouts indicates that the changes in the Project Layout do not result in a significant change for the overall visual impact of the Project. The differences in the proposed view from these viewpoints are relatively minimal, and generally reflect a minor change in the number and/or arrangement of turbines that will be visible. The height increase of the proposed turbines as shown in the SVRA2 simulations do not result in a significant change in the perceived scale contrast of the turbines relative to the simulations from in the SVRA. Relative to the SEIS Project layout that is depicted in the SVRA simulations, the potential visual effects of the SEIS2 Project layout are generally consistent with the visual effects of the SEIS Project layout.

The potential visual effect of the proposed generator lead line is depicted in the SVRA2 simulations for Viewpoints 14-Alt and S15 (see Figure 16: Sheet 26 and Figure 17: Sheet 1). As discussed in the SVRA2, although the generator lead structures will be tall steel poles (they range in height from 55 to 120 feet), the proposed generator lead will not significantly affect perceptions of the existing agricultural/rural land use. In addition, the Project also includes construction of substation in the Town of Pomfret. The substation is considered to have a minimal visual effect relative to the wind turbines. In addition, the engineering design for the substation has not been completed. Therefore, no visual simulation of the substation was prepared. However, to provide an evaluation of the potential visual effect of the substation, photographs of existing substation facilities built for other wind energy projects in New York are included as SVRA2 Figure 11 (see SEIS2 Appendix J).

2.5.2.2.6 FAA Lighting Plan Visibility

The current FAA lighting plan for the SEIS2 Project layout proposes use of 8 warning lights, which is a significant reduction from the 21 FAA lights evaluated for the SEIS Project layout. The viewshed analysis for the SEIS2 Project Layout FAA warning lights is included in Figure 14, Sheets 3 and 4. Comparison of the SEIS and SEIS2 FAA warning light viewshed analyses indicates minimal change in nighttime visibility. While the height of the FAA warning light has increased due to the change in proposed turbine model, the number of turbines proposed to be lit has decreased from 21 to 8. Review of viewshed mapping shows that the areas of potential FAA light visibility have decreased in size slightly in most areas but overall show a very similar pattern and extent of nighttime visibility. As indicated in Table 22, there is almost no change in the percentage of the study area that will have views of turbine lights. However, with the SEIS2 Project layout, most areas with nighttime visibility will have a view of significantly fewer turbine lights when compared to the SEIS layout. The SEIS analysis indicated that 13.8% of the visual study area would have views of 5 or more turbine lights and that number has dropped to 5.6% of the visual study area in the SEIS2 viewshed results.

Table 22. FAA Warning Light Viewshed Visibility Comparison

Number of FAA Warning Lights Visible[1]	Five-Mile-Radius Study Area FAA Warning Light Viewshed Results[2]							
	Considering Topography Only				Considering Topography and Vegetation			
	SVRA[3] (SEIS Project Layout)		SVRA2 (SEIS2 Project Layout)		SVRA (SEIS Project Layout)		SVRA2 (SEIS2 Project Layout)	
	Square Miles	% of Study Area	Square Miles	% of Study Area	Square Miles	% of Study Area	Square Miles	% of Study Area
0	-	-	27.5	19.9	125.5	78	107.0	77.4
1-2	-	-	20.7	14.9	6.6	4.1	11.9	8.6
3-4	-	-	31.6	22.9	6.6	4.1	11.8	8.5
5-6	-	-	27.7	19.9	6.0	3.7	5.1	3.7
7-10	-	-	30.7	22.2	11.7	7.3	2.6	1.9
11-15	-	-	0	0	2.9	1.8	0	0
16-21	-	-	0	0	1.6	1	0	0
Total Visible	-	-	**110.7**	**79.9**	**35.5**	**22**	**31.3**	**22.7**

[1] The current layout includes 8 FAA warning lights, and consequently, there are no locations from which 9-21 FAA warning lights would be visible. However, to facilitate direct comparison with the impacts presented in the SVRA, the same range of numbers of visible FAA warning lights was used.
[2] The SVRA visual study area totaled 161.0 square miles. The SVRA2 visual study area totals 138.3 square miles. Due to rounding to the 10th of a square mile and a 10th of a percentage, the sum of the individual turbine count group categories may not precisely equal the size of the study area or 100%.
[3] The SVRA did not include this analysis.

The FAA warning lights are synchronized, red-flashing warning lights mounted on the turbine nacelle, at a height of approximately 100 meters. A typical view of FAA warning lights from another New York wind energy project is included in SVRA2 Figure 12 (see SEIS2 Appendix J). Based upon nighttime photos/observations of existing wind power projects, the synchronized, red flashing lights on the turbines could result in a nighttime visual impact on certain viewers. The actual significance of this impact from a given viewpoint will depend on how many turbines are visible, what other sources of lighting are present in the view, the extent of screening provided by structures and trees, and nighttime viewer activity/sensitivity. However, night lighting could be somewhat distracting and have an adverse effect on rural residents and recreational users that currently experience (or expect) dark nighttime skies. It should be noted that nighttime visibility/visual impact will be reduced due to 1) FAA lighting guidelines (FAA, 2005) which typically do not require that all turbines need to be lit, 2) the abundance of woodlots and hedgerows that screen portions of the Project from many locations, and 3) the concentration of residences in villages, hamlets, and along highways where existing lights already compromise dark skies and compete for the viewer's attention. As noted previously, the current FAA lighting plan for the SEIS2 Project layout proposes use of 8 warning lights (see Figure 14: Sheets 3 and 4), which is a significant reduction from the 21 FAA lights proposed for the SEIS Project layout and evaluated in the SVRA.

2.5.2.2.7 Assessment of Shadow Flicker

As described in greater detail in Section 2.5 of the DEIS, shadow flicker refers to the moving shadows that an operating wind turbine casts over an identified receptor at times of the day when the turbine rotor is between the sun and a receptor's position. An updated shadow flicker analysis for the SEIS2 Project Layout was prepared and is included as Appendix K of this SEIS2. The location and duration of shadow flicker can be predicted using computer modeling programs and input data regarding turbine characteristics and weather conditions. A "worst-case" shadow-flicker scenario could be predicted based on the assumptions that there are no clouds or fog, wind conditions allow continuous turbine operation, the turbine rotor is continuously perpendicular to the sun, and the turbine rotor is positioned between the receptor and the sun. However, this "worst–case" scenario is not what would actually occur because turbines do not operate continuously, are not always aligned perpendicular to the sun, and are not always positioned between the receptor and the sun. In addition, sunlight intensity and duration vary daily and seasonally, and obstacles that block shadows (terrain, vegetation, and buildings) exist in the landscape.

The shadow-flicker analysis conducted for the proposed Project was based on the conservative assumption that turbines are in continuous operation during daylight hours, and that shadow flicker can be perceived at a receptor structure regardless of the presence or orientation of windows. The effects of surrounding buildings, forest vegetation, and yard/street trees are also not taken into account in the shadow flicker model. Altering these assumptions and considering these factors can result in the actual shadow flicker effect being substantially reduced, and in some instances completely eliminated. Local sunshine and wind direction frequency data are used to more accurately predict rotor alignment and the percent of daylight hours when shadows are likely to be cast.

This shadow flicker analysis evaluated the potential impact of 38 Vestas V110 turbines (which included the two alternate turbine locations), each with a rotor diameter of 110 meters and a hub height of 95 meters. Prior to conducting the shadow-flicker analysis, the Project Sponsor identified potential receptors in the vicinity of the Project. A study area of roughly 10 rotor diameters is typical for analysis of shadow-flicker effects. In the case of the Vestas V110 turbine used in this analysis, 10 rotor diameters equals 1,100 meters (3,675 feet). A maximum distance of potential effect of 1,100 meters was used for this analysis to ensure that all potentially impacted structures were assessed.

The shadow flicker analysis for the proposed Project used *WindPRO 2.8.579* software and associated Shadow module. *WindPRO* is a widely accepted modeling software package developed specifically for the design and evaluation of wind power projects. Input variables and assumptions used for shadow flicker modeling calculations for the proposed Project include:

- Latitude and longitude coordinates of 38 proposed wind turbine sites (provided by the Applicant).
- Latitude and longitude coordinates for 206 potential receptors located in the vicinity of the Project (provided by the Applicant).
- USGS 1:24,000 topographic mapping and USGS 10-meter resolution digital elevation model (DEM) data.
- The rotor diameter (110 meters) and hub height (95 meters) for the Vestas V110 turbine.
- Annual wind rose data (provided by the Applicant), to determine the approximate directional frequency of rotor orientation throughout the year.
- To account for the occurrence of cloudy conditions, the average monthly percent of available sunshine for the nearest NOAA weather station in Buffalo, New York was used. Data was obtained from NOAA's "Comparative Climatic Data for the United States through 2012" (http://www.ncdc.noaa.gov).
- No allowance was made for wind being below or above generation speeds. Blades are assumed to be moving during all daylight hours when the sun's elevation is more than 3 degrees above the horizon. Shadow flicker is generally considered imperceptible when the sun is less than 3 degrees above the horizon (due to the scattering effect of the atmosphere on low angle sunlight) (States Committee for Pollution Control, 2002).
- The possible screening effect of trees and buildings adjacent to the receptors was not taken into consideration in the modeling. In addition, the number and/or orientation of windows in residential structures were not taken into consideration in the analysis. However, consideration of potential Project visibility (per the Project's viewshed analysis) is included in the discussion of potential shadow-flicker impacts (see below).

Shadow-flicker effects on receptors are expressed in terms of predicted frequency (hours per year). Shadow isolines (i.e., contours indicating total number of hours of shadowing per average year) were calculated based on the data and assumptions outlined above. These isolines define the theoretical number of hours per year that shadow flicker would occur at any given location within a 1,100-meter radius of all proposed turbines (see Figure 18). A threshold of 30 hours per year was established in the Sections 2.5 and Appendix F of the DEIS as the level of impact for requiring additional analysis and possible mitigation measures. Further elaboration regarding the rationale for this 30 hours per year threshold is provided in SEIS2 Appendix K.

The model calculations include the cumulative sum of shadow hours for all Project turbines. This omni-directional approach reports total shadow flicker results at a receptor regardless of the presence or orientation of windows at that particular residence (i.e., it assumes shadows from all directions can be perceived at a residence, which may or may not be true). A receptor in this "greenhouse" model is defined as a one square meter area located one meter above ground; actual house dimensions are not taken into consideration. Therefore, the analysis presented herein is expected to be a conservative projection of the shadow-flicker effects at ground level.
The results of the WindPro model includes the following information (see SEIS2 Appendix K):

- Calculated shadow-flicker time (days per year, maximum hours per day, and total hours per year when shadow flicker is expected) at each of the 206 receptors located in the vicinity of the Project.
- Tabulated and plotted time of day that structures are predicted to receive shadow flicker.
- Shadow isolines, which are used to create maps showing turbine locations, receptors, and projected shadow-flicker duration (hours per year) without taking into consideration the effect of screening provided by vegetation and structures (see Figure 18).

A summary of the projected shadow flicker at each of the 206 receptors is presented below:

- 32 (15.8%) of the receptors are not expected to experience any shadow flicker,
- Two (1.0%) of the receptors may be affected 0-1 hour/year,
- 92 (44.7%) of the receptors may be affected 1-10 hours/year,
- 43 (20.9%) of the receptors may be affected 10-20 hours/year,
- 23 (11.2) of the receptors may be affected 20-30 hours/year,
- 14 (6.8%) of the receptors may be affected for more than 30 hours/year.

As these results indicate, 61.2% of the receptors are predicted to receive 10 hours of shadow flicker or less per year. Of these, 32 (or approximately 15.5% of all receptors) are predicted to receive no shadow flicker. At most receptor locations that experience shadow flicker, the effect will occur primarily in the early morning or late afternoon and will generally last less than 1 hour per day. The maximum daily duration of shadow flicker predicted at any receptor is 1 hour and 29 minutes (at receptor 387).

The attachments included in the shadow flicker report (SEIS2 Appendix K) provide more detail concerning the times of day and duration of shadow flicker experienced by each structure will vary throughout the calendar year based on the position of the sun in the sky and the direction of prevailing winds. These attachments also include a table indicating the amount of shadow flicker expected at each receptor and for detailed calendars that illustrate the specific times of year and day that shadow flicker may occur.

The results of this analysis indicate that 14 receptors are predicted to exceed the 30-hour threshold. The details regarding anticipated shadow flicker at these structures are summarized below in Table 23.

Table 23. Structures Exceeding 30 Hours of Shadow Flicker per Year.

Receptor ID	Project Status	Predicted Shadow Flicker (hh:mm/year)	Predicted Shadow Flicker (days/year)	Predicted Shadow Flicker (hh:mm/day)	Turbines Contributing Shadow Flicker	Approximate Times of Day Receptor Potentially Affected by Flicker[1]
44	Non-participant	38:20:00	171	0:55	21, 66, 114	6:00AM - 8:30AM 6:45PM - 8:15PM
103	Participant	53:04:00	258	0:58	19, 21, 66	7:00AM – 9:45AM 3:00PM – 4:30PM
104	Non-participant	39:56:00	193	0:52	19, 21, 66	6:45AM - 9:00AM 3:45PM – 5:45PM
113	Non-participant	41:06:00	224	0:52	29, 30, 33, 115	6:30AM – 9:30AM 7:30PM – 8:30PM
114	Participant	48:09:00	236	1:19	29, 30, 33, 100, 115	6:00AM – 10:15AM 7:15PM – 8:15PM
125	Non-participant	35:39:00	112	1:02	36, 51	6:00AM – 7:00AM 7:15PM - 8:15PM
126	Non-participant	30:08:00	118	0:51	36, 51	6:00AM – 7:00AM 7:15PM - 8:15PM
135	Participant	37:38:00	87	1:19	36, 51, 111	6:00AM – 7:00AM 7:30PM – 8:30PM
136	Participant	35:26:00	133	1:08	36, 51, 101, 111	6:00AM – 7:00AM 5:30AM – 7:00PM 7:30PM – 8:45PM
153	Participant	30:55:00	149	1:21	41, 43, 112, 115	6:15AM – 79:15AM
231	Non-participant	36:16:00	266	0:43	41, 43, 101, 112	6:30AM – 9:15AM

Receptor ID	Project Status	Predicted Shadow Flicker (hh:mm/year)	Predicted Shadow Flicker (days/year)	Predicted Shadow Flicker (hh:mm/day)	Turbines Contributing Shadow Flicker	Approximate Times of Day Receptor Potentially Affected by Flicker[1]
232	Non-participant	32:59:00	197	0:38	41, 43, 10	6:15AM - 9:15AM
233	Participant	52:14:00	257	1:03	11, 15, 16, 114	7:45AM - 9:15AM
						5:30PM - 6:45PM
						7:00PM - 8:30PM
387	Participant	49:01:00	251	1:29	28, 29, 30, 100, 115	6:15AM – 8:15AM
						8:30AM - 10:45AM
						7:00PM – 7:45PM

[1]The times of day presented in Table 23 represent the range of times during which each structure could potentially experience shadow flicker throughout the year; however, no structures will experience shadow flicker every day during all those hours. See Attachment B for detailed calendars that illustrate the specific times of year and day that each structure may experience shadow flicker.

Although shadow flicker at these 14 receptors exceeds the 30-hour per year threshold, these calculations do not take into account the actual location and orientation of windows, or the screening effects associated with existing, site-specific conditions and obstacles such as vegetation and/or buildings. Further, this analysis assumes turbine rotors are continuously in motion during daylight hours. Given these assumptions, the predicted shadow-flicker frequency represents a conservative scenario, and almost certainly overstates the actual frequency of shadow flicker that would be experienced at any given receptor location. In addition, many of the modeled shadow flicker hours are expected to be low intensity because they would occur during the early morning or late afternoon hours when the sun is low in the sky. As the sun sinks below the horizon, more of its light is scattered by the atmosphere, which has the effect of dampening its brightness and therefore reducing its ability to cast dark shadows (EMD, 2013).

To provide a more realistic prediction of where shadow flicker will actually be perceived, the conservative model results were compared to the results of the viewshed analysis conducted for the Project as well as the results of field review. This included comparison of receptors predicted to receive greater than 30 hours of shadow flicker with the Project's vegetation viewshed, which takes into consideration the screening effect of mapped forest vegetation with an assumed average height of 40 feet. In addition, a field review was conducted on June 10, 2015 to identify and document the potential screening elements that currently exist adjacent to receptors. The presence of existing screening was specifically evaluated at all receptor modeled to receive over 30 hours of shadow flicker per year, and documented with field notes and photographs.

Comparison with the viewshed analysis indicates that 8 of the 14 receptors predicted to experience over 30 hours of shadow flicker will not have views of the Project. Additionally, field verification determined that of the 6 remaining receptors not excluded by the viewshed analysis, 6 would most likely have no or limited visibility of the Project. Therefore, these receptors would experience either no shadow flicker, or in the instances where receptors have partial or limited visibility of the Project, the shadow flicker received by that receptor would be far less than predicted by the model.

A comparison of the projected shadow flicker at receptors located within 1,000 meters of a proposed turbine site (for the DEIS and SEIS layouts) and 1,100 meters of the SEIS2 Project Layout are presented in Table 24. Of the 206 receptors within 1,100 feet of the SEIS2 Project Layout, there are 14 receptors (6.8%) that are predicted to exceed 30 hours of shadow flicker per year. This is a slight increase from the 12 receptors predicted to receive more than 30 hours per year in the DEIS and SEIS. However, as described above, due to the screening effects of vegetation, only one receptor within the study area has the potential to receive more than 30 hours of shadow flicker per year. Due to the low overall number of potentially affected receptors, the Project is not anticipated to result in significant shadow flicker impacts.

Table 24. DEIS/SEIS/SEIS2 Shadow Flicker Effects Comparison

Predicted Shadow Flicker	**DEIS Layout**		**SEIS Layout**		**SEIS2 Layout**	
	62 turbines		47 turbines		38 turbines	
	211 receptors within 1,000 meters of turbines		206 receptors within 1,000 meters of turbines		206 receptors within 1,000 meters of turbines	
	Receptors (count)	**% of Receptors**	**Receptors (count)**	**% of Receptors**	**Receptors (count)**	**% of Receptors**
0 hours	16	8%	15	7%	32	16%
0-1 hour/year	4	2%	2	1%	2	1%
1-10 hours/year	109	52%	113	55%	92	45%
10-20 hours/year	55	26%	46	22%	43	21%
20-30 hours/year	15	7%	18	9%	23	11%
30+ hours/year	12	6%	12	6%	14	7%

2.5.3 Mitigation Measures

2.5.3.1 Construction

Construction-related mitigation measures are as described in the DEIS. Because construction- related impacts to visual resources are anticipated to be minor and temporary, no mitigation is required. The Applicant will ensure work areas are confined to the Project Site and are well maintained.

2.5.3.2 Operation

2.5.3.2.1 Visual and Aesthetic Resources

The potential visual effects of the SEIS 2 Project layout are generally consistent with the visual effects of the SEIS Project layout. Changes in the Project layout result in a reduction in the size of the 5-mile visual study area from 161.0 square miles to 138.3 square miles. However, the results of the viewshed analyses for the SESI2 Project layout indicate a similar pattern and extent of Project visibility relative to the SEIS Project layout viewshed results presented in the SVRA. A comparison of the visual simulations for the SEIS and SEIS2 Project layouts indicate that relative to the SEIS Project layout that is depicted in the SVRA simulations, the changes in the SVRA2 Project layout do not result in a significant change in the overall visual impact of the Project. Due to the inherent requirements for wind energy projects (very tall structures located in areas of high elevation), visual impacts cannot be avoided and mitigation options are limited. In accordance with NYSDEC *Program Policy: Assessing and Mitigating Visual Impacts* (NYSDEC, 2000), proposed mitigation measures for the potential visual effects of the Project are described in Section 2.5.3.2 of the SEIS. In addition to the discussion presented in the SEIS, considerations relevant to the mitigation measures included in the NYSDEC Program Policy include:

A. Professional Design. All turbines will have uniform design, speed, color, height and rotor diameter. Turbines will be mounted on conical steel towers that include no exterior ladders or catwalks. The placement of any advertising devices (including commercial advertising, conspicuous lettering, or logos identifying the Project owner or turbine manufacturer) on the turbines will be prohibited.

B. Screening. Due do the height of individual turbines and the geographic extent of the proposed Project, screening of individual turbines with earthen berms, fences, or planted vegetation will generally not be effective in reducing Project visibility or visual impact. However, if adequate natural screening is lacking at the proposed substation site, a planting plan should be developed and implemented to minimize the visibility of this facility.

C. Relocation. Because of the limited number of suitable locations for turbines within the Project Site, and the variety of viewpoints from which the Project 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 Project. Where visible from sensitive resources within the study area, generally more than half of the proposed turbines will be visible, and relocation of individual machines would have little effect on overall visual impact. Additionally, throughout the study area, views of the Project are highly variable and include different turbines at different vantage points. Therefore, turbine relocation would generally not be effective in mitigating visual impacts. Additionally, the Project layout has been designed to accommodate set-backs from roads and residences. Options for relocation of individual Project components are constrained by compliance with these various setbacks.

D. Camouflage. The white/off white color of wind turbines (as mandated by the FAA) generally minimizes contrast with the sky under most conditions. This is demonstrated by simulations prepared under a variety of sky conditions. Other components of the Project will be designed to minimize contrast with the existing agricultural character in the Project area. For instance, new road construction will be minimized by utilizing existing farm lanes wherever possible and electrical collection lines will be buried.

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

F. Downsizing. The SEIS2 Project layout reduces the number of proposed turbines from 44 to 36 without compromising Project benefits or energy generation. Given the current technologies available, further reduction in the proposed number of turbines would compromise the Project's energy generation potential and associated benefits.

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

H. Non-specular Materials. Non-reflective paints and finishes will be used on the wind turbines and other Project facilities to minimize reflected glare.

I. Lighting. Turbine lighting will be kept to the minimum allowable by the FAA. It is anticipated that 8 of the proposed turbines will be lit. 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 considered as a means of minimizing the visibility/intensity of FAA warning lights at ground-level vantage points. Lighting at the substation will be kept to a minimum, and turned on only as needed, either by switch or motion detector. Full cut-off fixtures will be utilized to the extent practicable (consistent with safety and security requirements).

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

K. Offsets. Correction of an existing aesthetic problem within the viewshed is a viable mitigation strategy for wind power projects that result in significant adverse visual impact. In addition, as noted previously in Section 2.5 of this SEIS2, the Applicant has undertaken consultation with the Lead Agency and NYSOPRHP regarding the Project's potential visual effects on historic resources. This has resulted in the Applicant entering into an agreement with the Town of Arkwright to provide funds for historic preservation projects that will mitigate the Project's visual effect on historic resources.

Inclusion of the mitigation measures described herein helps to minimize the visual impacts of the Project. By reducing the proposed number of turbines and selecting a more efficient and more productive turbine model, the SEIS2 Project layout balances the potential energy generation and associated benefits of the Project while minimizing visual impacts.

2.5.3.2.2 Shadow Flicker

As described above, the current shadow flicker analysis is considered to present a worst case scenario, particularly considering the Project Sponsor will only construct and operate 36 wind turbines of the 38 potential turbine locations included in the analysis. Therefore, it is anticipated that the number of hours per year that some receptors will experience shadow flicker will be less than modeled. In general, due to the low overall number of potentially affected receptors, the Project is not anticipated to result in significant shadow flicker impacts. The analysis indicates that 14 receptors are predicted to receive more than 30 hours per year of shadow flicker. Comparison with the viewshed analysis indicates that 8 of the 14 receptors predicted to experience over 30 hours of shadow flicker will not have views of the Project. Additionally, field verification determined that of the 6 remaining receptors not excluded by the viewshed analysis, 6 would most likely have no or limited visibility of the Project. These receptors would experience either no shadow flicker, or in the instances where receptors have partial or limited visibility of the Project, the shadow flicker received by that receptor would be far less than predicted by the model.

It is worth noting that 7 of the 14 receptors predicted to receive more than 30 hours of shadow flicker are Project participants. Despite the fact that views from 7 of the remaining 7 affected receptors are largely screened by vegetation, in order to avoid the potential for annoyance or other impacts, the Applicant is currently pursuing setback agreements with the remaining 7 potentially affected property owners. Additionally, the Applicant will be offering these landowners neighbor agreements that include waivers for sound and shadow flicker.

2.6 HISTORICAL, CULTURAL, AND ARCHAEOLOGICAL RESOURCES

2.6.1 Existing Conditions

2.6.1.1 Archaeological Resources

The Project's archaeological area of potential effect (APE) for archaeological resources is defined as those areas where soil disturbance is proposed to occur during construction. The Applicant previously retained Tetra Tech, Inc. (Tetra Tech) between 2007 and 2009 to investigate the Project's potential effect on archaeological and historic-architectural resources within the APEs for archaeology and historic architecture. Previous archaeological survey work for the Project has included the following:

- A Phase 1 archaeological survey was conducted for DEIS Project Layout (Tetra Tech, 2008; DEIS Appendix G).
- Subsequent to the submission of the DEIS but prior to the submission of the SEIS, a supplemental Phase 1B archaeological survey was conducted for the SEIS Project Layout (Tetra Tech, 2009a: SEIS Appendix F).
- Following the submission of the SEIS, an addendum Phase 1B archaeological survey was conducted for the SEIS Project Layout (Tetra Tech, 2009b).
- As part of the preparation of the SEIS2, an additional supplemental Phase 1B archaeological survey was conducted for the current Project layout (EDR, 2015; see SEIS2 Appendix L).

The first three cultural resources surveys were completed and reviewed by the New York State Office of Parks, Recreation, and Historic Preservation (NYSOPRHP) under Project Review No. 08PR0564. The supplemental Phase 1B archaeological survey for the SEIS2 Project Layout (EDR, 2015; SEIS2 Appendix L) was also submitted to and reviewed by NYSOPRHP, who concurred with the report's findings (see SEIS2 Appendix C). The supplemental Phase 1B archaeological survey for the SEIS2 Project Layout addresses only a 1.9-mile (3.1-kilometer) long section of the proposed overhead generator lead and the adjacent proposed 2-acre substation/POI switchyard parcel, both of which occur outside the area subject to the three earlier Phase 1B archaeological surveys.

The previous Phase 1B archaeological survey efforts associated with the DEIS and SEIS Project Layouts are summarized in Table 1 of Appendix L, and comprise a total of 4,173 shovel test pits (STPs) excavated. Six prehistoric archaeological sites, four prehistoric isolated finds (IFs) and no historic archaeological sites or IFs were identified during the four Phase 1B archaeological surveys conducted for the Project. The archaeological resources are discussed further below in Subsection 2.6.2.1.1 and in Appendix L.

2.6.1.2 Architectural Resources

EDR prepared a Historic-Architectural Resources Summary report (see SEIS2 Appendix M), which provides a synopsis of cultural resources fieldwork, reports, and consultation with the NYSOPRHP (per their role as State Historic Preservation Office [SHPO]) for this project to date. In addition, the Historic-Architectural Resources Summary evaluates the SEIS2 Project Layout's potential effect on historic resources. The Historic-Architectural Resources Summary was submitted to NYSOPRHP for review on July 24, 2015. On August 27, 2015, NYSOPRHP provided review correspondence indicating their concurrence with the findings and recommendations in the Historic-Architectural Resources Summary (see SEIS2 Appendix M). The information presented in that report relative to historic resources within the study area is summarized below:

Historically significant properties are defined herein to include buildings, districts, objects, structures and/or sites that have been listed on the NRHP, as well as those properties that NYSOPRHP has formally determined are eligible for listing on the NRHP. Criteria set forth by the National Park Service for evaluating historic properties (36 CFR 60.4) state that a historic building, district, object, structure or site is significant (i.e., eligible for listing on the NRHP) if the property conveys (per CFR, 2004; NPS, 1990):

> *The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association and:*
>
> *(A) that are associated with events that have made a significant contribution to the broad patterns of our history; or*
> *(B) that are associated with the lives of persons significant in our past; or*

(C) that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
(D) that have yielded, or may be likely to yield, information important in prehistory or history.

The *New York State Historic Preservation Office Guidelines for Wind Farm Development Cultural Resources Survey Work* (the *SHPO Wind Guidelines*; NYSOPRHP, 2006) define the (APE relative to historic-architectural resources for wind energy projects in New York as those areas within 5 miles of proposed turbines which are within the potential viewshed (based on topography) of a given project.

A 5-mile historic-architectural resources survey for the proposed Project was previously conducted in 2009 and was reviewed by the NYSOPRHP under Project Review No. 08PR0564 (Tetra Tech, 2009c). To support that study, the Applicant retained Tetra Tech, Inc. (Tetra Tech) between 2007 and 2009 to investigate the Project's potential effect on archaeological and historic-architectural resources.

The *Historic Architectural Resources Investigation 5-Mile Ring Study* (Tetra Tech, 2009c) conducted for the SEIS Project Layout resulted in identification of the following:

- 100 resources previously listed in or determined eligible for the National Register of Historic Places (NRHP)
- 3 historic districts previously listed in or determined eligible for the NRHP
- 184 resources determined to be potentially eligible for the NRHP
- 2 historic districts determined to be potentially eligible for the NRHP

NYSOPRHP concurred with all of the above NRHP recommendations with the exception of six (6) buildings, which it found to be ineligible, for a total of 278 resources and five (5) historic districts previously listed on or determined eligible for the NRHP.

Historic districts comprise a significant number of historic-architectural resources within the Project APE, including:

- Fredonia Commons Historic District, Fredonia (NRHP-listed, 25 resources)
- Proposed Fredonia Commons Historic District Expansion, Fredonia (NRHP-Eligible, 22 resources)
- Proposed Central Avenue Historic District, Fredonia (NRHP-Eligible, 29 resources)
- Proposed East Main Street Historic District, Fredonia (NRHP-Eligible, 37 resources)
- Proposed Center Street Historic District, Forestville (NRHP-Eligible, 15 resources) (Not identified in *Historic Architectural Resources Investigation 5-Mile Ring Study*)

- Proposed Sheridan Historic District, Sheridan (NRHP-Eligible, 15 resources)

In addition to the resources identified in the *5-Mile Ring Study,* EDR noted several previously identified historic-architectural resources within the Project APE in the NYSOPRHP Cultural Resources Information System (CRIS) database. The "Previously Identified Historic-Architectural Resources" map (see Figure 4 of Appendix M) depicts the locations of historic-architectural resources identified during the 2009 architectural survey conducted in support of the DEIS (Tetra Tech, 2009b), as well as those resources identified through EDR's review of the Project APE using the CRIS database. A total of ten (10) resources and one proposed historic district (Center Street Historic District, Forestville) were identified in CRIS within the APE not accounted for in the *5-Mile Ring Study.* In addition, one resource identified in the 2009 survey (15 Main Street, Village of Forestville, USN 01352.000110) was found to be no longer standing.

EDR identified a total of eight (8) NRHP-eligible resources discussed in the 2009 *5-Mile Ring Study* (Tetra Tech, 2009c) that are now located outside of the SEIS2 Project Layout APE (due to a reduction in the size of the APE). These resources are not included in the evaluation of potential impacts from the SEIS2 Project Layout. The extent of the Project footprint, and therefore the extent of the associated 5-mile study area, for the current SEIS2 Project Layout are smaller than the area examined for the 2009 *5-Mile Ring Study* Tetra Tech, 2009c). Additionally, the current 5-mile study area occurs entirely within the 2009 5-mile study area (see Figure 4 in Appendix M). However, the majority of previously identified NRHP-eligible and NRHP-listed resources documented in the 2009 *5-Mile Ring Study* (Tetra Tech, 2009c) are still located within the APE for the SEIS2 Project Layout.

2.6.2 Anticipated Impacts

2.6.2.1 <u>Construction</u>

2.6.2.1.1 Archaeological Resources

Because construction of the Project will include ground disturbance, the Project has the potential to result in adverse impacts to archaeological resources. Impacts to archaeological resources, which are identified through the survey work, are typically avoided through careful siting of the Project and construction planning. It is worth noting that three of the previous Phase 1B archaeological surveys conducted between 2007 and 2009 (Tetra Tech, 2008; 2009a; 2009b) evaluated a Project layout that has subsequently been revised. These previous surveys resulted in the identification of six archaeological sites and four archaeological isolated finds. The 2015 Phase 1B archaeological survey (EDR, 2015) did not result in the identification of any archaeological sites or isolated finds.

The archaeological resources are summarized in Table 3 of Appendix L. The archaeological resources are discussed in more detail in the Supplemental Phase 1B Archaeological Survey Report (EDR, 2015), included as Appendix L. The SEIS2 Project layout has been sited to avoid impacts to archaeological resources.

2.6.2.1.2 Architectural Resources

Construction of the Project will not require the demolition or physical alteration of any buildings or other potential historic resources. No direct physical impacts to historic-architectural resources will occur as a result of the Project. Therefore, impacts to architectural resources resulting from Project construction remain unchanged since the DEIS and SEIS Project layouts.

2.6.2.2 <u>Operation</u>

2.6.2.2.1 Archaeological Resources

Once the proposed Project has been constructed, no significant earth-disturbing activities associated with operation and maintenance of the Project will occur. Therefore, Project operation will not have any impacts on archaeological resources.

2.6.2.2.2 Architectural Resources

The Project's potential effect on a given historic property would be a change (resulting from the introduction of wind turbines) in the property's visual setting. As it pertains to historic properties, *setting* is defined as "the physical environment of a historic property" and is one of seven aspects of a property's *integrity*, which refers to the "ability of a property to convey its significance" (NPS, 1990:44-45). The other aspects of integrity include location, design, materials, workmanship, feeling, and association (NPS, 1990). The potential effect resulting from the introduction of wind turbines into the visual setting for any historic or architecturally significant property is dependent on a number of factors including distance, visual dominance, orientation of views, viewer context and activity, and the types and density of modern features in the existing view (such as buildings/residences, overhead electrical transmission lines, cellular towers, billboards, highways, and silos).

The potential visibility of the Project from the identified historic resources within the study area is summarized in Appendix M. The number of turbines potentially visible from each historic property within the study area (considering the effects of screening provided by mapped forest vegetation) is listed in Attachment 1 of Appendix M. The visual effects analysis shown on Figure 4 of Appendix M includes analysis of potential visibility of the Project in the daytime.

The visibility analysis presented in Appendix M includes the distance from each historic resource to the nearest turbine in the SEIS2 layout. Views of the Project will be screened by topography and/or vegetation from 62 of the 170 resources and historic districts listed or eligible for the NRHP within the SEIS2 study area. There is one resource located less than 0.5-mile from the Project (i.e., where the Project would be a feature in the foreground) and there are 28 resources located between 0.5 and 3.0 miles from the Project (i.e., where the Project would be a feature in the middleground). The Project will be visible from only fifteen of these resources. In addition, there are 141 resources located more than 3.0 miles from the Project (i.e., resources where the Project would be a feature in the background) – 92 of these have potential views of the Project. In addition, 8 of the resources are located beyond 5 miles, and therefore, outside the SEIS2 study area, but are listed due to their inclusion in the 2009 *5-Mile Ring Study.* None of these resources have potential views of the Project.

In review correspondence dated March 9, 2009 and October 13, 2009, NYSOPRHP indicated that they had identified several key loci where visual impacts should be carefully assessed, including the villages of Fredonia, Sheridan, and Forestville, and the Hamlet of Hamlet, and recommended that visual simulations (or similar analyses) be created to better understand the full extent of the potential visual impacts associated with the Project. To show anticipated visual changes associated with the proposed project, high-resolution computer-enhanced image processing was used to create realistic photographic simulations of the completed Project from each of the areas identified by NYSOPRHP (see Appendix M).

The locations of visual simulations are indicated on Figure 4 of Appendix M), and the complete set of photographic simulations developed for this project is provided as Figure 5 of Appendix M). From some of the vantage points identified by NYSOPRHP, the proposed Project will be screened by existing buildings and/or vegetation. In these instances, the simulations included in Figure 5 (Appendix M) depict a color overlay of the accurate location and scale of the turbines, if the turbines were actually visible from those locations. These renderings are included to illustrate the effect that screening provided by vegetation, topography and/or buildings has on Project visibility from some of the locations indicated by NYSOPRHP.

The APE for the current SEIS2 Project layout is located entirely within the APE for the Project as presented in the DEIS, and therefore, the study area of the previous *5-Mile Ring Study* (Tetra Tech, 2009c). No new areas of potential Project visibility are included within the APE of the SEIS2 layout. In addition, the number of turbines included in the SEIS2 layout has been reduced from 44 to 36, thereby decreasing the potential for visibility from historic resources previously listed on or determined to be eligible for the NRHP.

In review correspondence dated March 9, 2009, NYSOPRHP stated that the Project would result in an indirect (visual) adverse effect on historic properties and that mitigation measures need to be considered. The reduction of the number of proposed turbines and corresponding reduced size of the visual study area does serve to reduce the potential visual impact of the Project. However, the results of the visual analysis described in Appendix M indicate that the overall effect of the Project on historic resources will be generally the same as that described in the previously prepared SEIS for the Project. In their review letter dated August 27, 2015, NYSOPRHP indicated their concurrence with the findings and recommendations in the Historic-Architectural Resources Summary (see SEIS2 Appendix M) and confirmed their previous determination of an adverse effect for historic resources.

2.6.3 Proposed Mitigation

2.6.3.1 <u>Construction</u>

2.6.3.1.1 Archaeological Resources

It is anticipated that all the archaeological resources identified within the Project Site will be avoided during Project construction. The SEIS2 Project Layout has been sited to avoid archaeological resources identified within the APE. However, in the event that a potentially significant archaeological resource is located within the APE, and Project facilities cannot be relocated to avoid impacts to the resource, then a Phase 2 archaeological site investigation (in consultation with NYSOPRHP) will be conducted. The mapped locations of identified archaeological sites will be included on Project construction maps surrounded by an avoidance buffer, identified as “Environmentally Sensitive Areas” or similar, and marked in the field by construction fencing with signs that restrict access. These measures should be adequate to ensure that impacts to archaeological resources are avoided.

In the event that unanticipated archaeological resources are encountered during construction, the environmental monitoring plan will include provisions to stop all work in the vicinity of the archaeological finds until those resources can be evaluated and documented by a Registered Professional Archaeologist.

2.6.3.1.2 Architectural Resources

There are no anticipated long-term impacts to architectural resources resulting from Project construction.

2.6.3.2 <u>Operation</u>

2.6.3.2.1 Archaeological Resources

There are no anticipated impacts to archaeological resources resulting from Project operation. Therefore, no mitigation is necessary.

2.6.3.2.2 Architectural Resources

Mitigation options are limited, given the nature of the Project and its siting criteria (very tall structures typically located at the highest locally available elevations). Mitigation for impacts to historic properties therefore typically consist of projects that benefit historic properties and/or the public's appreciation of historic resources to offset potential impacts to historic properties resulting from the introduction of wind turbines into their visual setting. Mitigation projects that have been proposed for other wind energy projects in New York State have included activities such as additional historic resources surveys, NRHP nominations, monetary contributions to historic property restoration causes, development of heritage tourism promotional materials, development of educational materials and lesson plans, and development of public history materials, such as roadside markers.

As part of consultation with the Lead Agency and NYSOPRHP for the DEIS and SEIS, the Applicant had previously defined mitigation projects to address the impacts to cultural resources posed by the Project. In correspondence dated August 25, 2009, the Applicant indicated that consultations with the Town Supervisor and Town Historian of the Town of Arkwright had defined the following proposed mitigation actions related to two cemeteries in the Town of Arkwright, totaling $102,000:

- Replication of degraded sections of the historic Christian Cemetery fence, at a cost not to exceed $60,000
- Stabilization or restoration of up to 70 selected grave markers at the town-owned Christian Cemetery, at a cost not to exceed $20,500
- Stabilization or restoration of up to 35 selected grave markers at the town-owned Cowden's Corners Cemetery, at a cost not to exceed $10,500
- Creation of a Cemetery Preservation and Maintenance Fund of $10,000
- Undertaking a boundary survey of the Christian Cemetery to determine the relationship between the boundaries of the lot and cemetery fence, at a cost not to exceed $1000

Additional outreach to other municipalities located within the Project APE did not yield any additional proposed mitigation actions. In review correspondence dated September 20, 2010, NYSOPRHP indicated their approval of this proposed mitigation plan, and expressed that the Applicant should continue to work with any communities that expressed an interest in potential mitigation projects. The Applicant has recently re-confirmed these mitigation Projects with the Town of Arkwright, and NYSOPRHP's August 27, 2015 letter also indicates their continued support for these mitigation projects (see SEIS2 Appendix C). To mitigate the Project's adverse effect on historic resources, the Applicant intends to enter into an agreement with the Town of Arkwright to fund the historic preservation projects described above.

2.7 SOUND

To evaluate potential sound impacts from the turbines proposed for the SEIS2 Project, Hessler Associates, Inc. (Hessler) prepared an *Environmental Sound Survey and Noise Impact Assessment* (Hessler Associates, Inc., 2015). This document is included as Appendix N of this SEIS2. The two primary phases of the study consisted of 1) ambient sound level surveys during both summer (foliate) and winter (defoliate) conditions to characterize the existing acoustical environment and 2) a computer modeling analysis of future Project operation sound levels, which were compared to the noise thresholds set forth in the local ordinance and NYSDEC guidelines. For the purpose of presenting a conservative analysis, Hessler Associates evaluated all potential 38-turbine site locations, although only a maximum of 36 turbines will be constructed and operated. In addition, all of the turbines include in the model were assumed to be Vestas V110–2.2 MW turbines, which according to the manufacturer specifications, has sound power levels slightly higher (between approximately 1 and 5 dBA, depending on wind speed) than the wind turbines used in the noise analyses presented in the DEIS and SEIS. Noise contour maps of the Project Site visually representing the results of the modeling were completed to determine whether the SEIS2 Project layout will operate in compliance with the applicable state and local guidelines and standards.

Acoustical terms used in this section are defined as follows:

- *Ambient noise level*: The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
- *Decibel (dB)*: A unit describing the amplitude of sound.
- *A-weighted sound pressure level (dBA)*: The sound pressure level in decibels as measured on a level meter using the A-weighted filter network. The A-weighted filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise.
- *Equivalent Sound Level (L_{eq})*: The L_{eq} integrates fluctuating sound levels over a period of time to express them as a steady-state sound level. Equivalent Sound Level is considered to be related directly to the effects of sound on people since it expresses the equivalent magnitude of the sound as a function of frequency of occurrence and time.

- *Statistical Sound Level (L10)*: The L10 sound level is the sound level during any given measurement interval that is exceeded only 10% of the time. L10 sound levels are normally driven by man-made or natural sounds that are usually considered interference or contamination, such as car passes, planes flying over, bird activity, nighttime insects, farm equipment etc.
- *Residual Sound Level (L90)*: The L90 (residual) sound level is a generally conservative measure of background sound levels as it excludes short-duration, sporadic noise events that do not provide consistent and continual masking noise to obscure potential turbine noise. Instead, L90 represents the quieter, momentary lulls that occur between short-duration sound events, such as passing cars. While the L90 sound level effectively provides a metric for the lowest level of masking sound, the L90 level occurs only a small fraction of the time (10% of the time), and it is not a long-term or continuous phenomenon.

2.7.1 Existing Conditions

As mentioned above, Hessler Associates conducted baseline noise surveys to determine existing ambient environmental sound levels within the vicinity of the Project. These baseline surveys were conducted as part of the original sound studies for the Arkwright Summit Wind Project (Hessler Associates, 2008). Two separate surveys were carried out for the Project to evaluate seasonal differences in existing sound levels: during foliate summertime conditions, from September 9 to September 25, 2007, and during wintertime conditions with trees bare, from November 29 to December 12, 2007. Land use and vegetation within the Project site has not changed since the ambient sound data was collected in 2007. Therefore this data is considered to remain valid and no new ambient sound data was conducted for the current analysis. The sound monitoring data was then used to compare existing ambient sound levels to future operational levels and to assess compliance with applicable criteria.

2.7.1.1 <u>Measurement Locations</u>

As described in the DEIS and SEIS, to evaluate background sound levels, Hessler identified a total of eight measurement positions (five in the summertime and additional three in the winter), which were selected to represent the acoustic environments experienced at residences nearest to turbines and to cover the Project area in a uniform manner. Each monitoring location was near a typical home or farm and, in most cases, the monitor was placed in the rear yard, away from exposure to local road traffic or other significant sources of noise. Appendix N of this SEIS2 includes descriptions and photographs of each measurement position as well as a map depicting their respective locations.

2.7.1.2 Sound Survey Results

Review of the L90 sound levels recorded during the summertime survey shows that sound levels throughout the study area are of the same order of magnitude with some local variation present. A majority of this variation is likely the result of various insects and birds near each monitoring station. Insect and bird noise is generally confined to higher frequencies and therefore plays a fairly minor role in masking mid-frequency wind turbine noise. Consequently, the average sound level over all of the monitoring stations, which is plotted in Figure 2.5.2 of Appendix N of this SEIS2, was taken as a representative measure of the site-wide L90 sound level, and was utilized as the "conservative" design level. When the relationship between wind speed and L90 was assessed (Figure 2.5.3 of Appendix N of this SEIS2), it is apparent that the correlation between the two increases and wind speed approaches its maximum.

The averaged summertime L_{eq} sound level data from all of the summertime monitoring stations is plotted in Figure 2.5.5 of Appendix N of this SEIS2. These data are also plotted against wind speed in Figure 2.5.6 of Appendix N of this SEIS2. During foliate summer conditions, the average ambient L_{eq} ranges from 42 dBA at 4 m/s (approximate WTG cut-in wind speed) to 46 dBA at 9 m/s (approximate WTG full rotational speed). During the wintertime conditions, the ambient L_{eq} ranges from 41 dBA at 4 m/s to 49 dBA at 9 m/s.

In addition to the L90 and L_{eq} sound levels, the Town of Arkwright Local Law (Local Law No. 2 of 2007) requires that the L10 statistical sound level be assessed before and after construction of the Project. Figure 2.5.7 of Appendix N of this SEIS2 shows the averaged site-wide summertime L10 sound level plotted against concurrent wind speed. As indicated in this figure, the L10 sound level typically ranges from about 30 to 53 dBA. Furthermore, L10 sounds levels do not appear to be strongly correlated with wind speed, except at high wind speed, which is not particularly surprising considering that L10 sound level is usually driven by man-made or natural sounds such as car passes, airplanes, farm equipment, and nearby bird activity. Figure 2.5.8 of Appendix N of this SEIS2 demonstrates that existing background L10 sound levels can at times exceed the Town limit of 50 dBA.

Results from the wintertime sound surveys contrast with the summertime surveys in some respects. Most notably is that the wintertime L90 sound levels were much more highly correlated with wind speed than in the summertime (Figures 2.8.1 and 2.8.3 of Appendix N of this SEIS2). This is most likely due to the absence of insect and bird noise during the wintertime. An increased correlation with wind speed was also observed for L_{eq} and L10 sound levels during the wintertime surveys.

The data collected over the two noise level survey periods allows for a determination of the A-weighted sound levels that are likely to occur in each season over the wind speed range of interest, which is generally between 3 and 10 m/s. This wind speed range is relevant to wind turbines because wind turbine sound emissions generally vary from wind speeds of 3 or 4 m/s, up to approximately 8 m/s when the rotors reach maximum speed and sound levels remain largely constant. Taken together, the noise level surveys show that there is a significantly higher correlation between sound levels and wind speed during the winter than in the summer. However, it can also be seen that environmental sound levels increase with wind speed in both seasons. Table 2.8.1 of Appendix N of this SEIS2 (and provided below) provides a summary of the average measured L90 and L_{eq} sound levels as function of wind speed for both winter and summer conditions. From this table, it is apparent that at high wind speeds, wintertime and summertime sound levels are quite similar, with the relationship becoming less strong as wind speed decreases.

Table 25. Mean Measured L90, Leq and L10 Background Sound Levels as a Function of Wind Speed during Winter and Summer Conditions

Integer Wind Speed at Standardized Height of 10 m/s	4	5	6	7	8	9	10	11
Wintertime Conservative L90 Sound Level, dBA	32	34	37	38	40	42	44	47
Wintertime Typical Leq Sound Level, dBA	41	42	44	45	47	49	50	52
Wintertime Average L10 Sound Level, dBA	43	44	47	48	49	51	53	52
Summertime Conservative L90 Sound Level, dBA	36	37	39	40	41	43	44	46
Summertime Typical Leq Sound Level, dBA	42	43	44	45	45	46	47	48
Summertime Average L10 Sound Level, dBA	43	43	45	45	46	47	48	49

2.7.2 Anticipated Impacts

2.7.2.1 Regulatory Standards and Guidelines

There are no universally accepted methods to measure the subjective effects of noise, or to measure the corresponding reactions of human annoyance and dissatisfaction. However, it is a well-established fact that for a new broadband, atonal noise source with a frequency spectrum similar to that of the background, a cumulative increase in the total sound level of about 5 or 6 dBA is required before the new sound begins to be clearly perceptible or noticeable to most people. Cumulative increases of between 3 and 5 dBA are generally regarded as negligible or hardly audible.

2.7.2.1.1 Town of Arkwright Noise Regulations

The Town of Arkwright's wind energy ordinance (Local Law No. 2 of 2007) requires that noise from any wind energy conversion system be limited to 50 dBA measured in terms of the L10 statistical level at "the nearest residence existing at the time of application". In addition, the ordinance states the following:

"If the ambient sound level exceeds 50 dBA, the standard shall be ambient dBA plus 5 dBA. Independent certification shall be provided before and after construction demonstrating compliance with this requirement. In the event audible noise due to WECS operation contains a steady pure tone, such as a whine, screech or hum, the standards for audible noise set forth in subparagraph 1) of this subsection shall be reduced by five (5) dBA. A pure tone is defined to exist if the one third (1/3) octave band sound pressure level in the band, including the tone, exceeds the arithmetic average of the sound pressure levels of the two (2) contiguous bands by:

5 dB for center frequencies of 500 Hz or above
8 dB for center frequencies between 160 and 500 Hz
15 dB for center frequencies less than or equal to 125 Hz

In the event the ambient noise level (exclusive of the development in question) exceeds the applicable standard given above, the applicable standard shall be adjusted so as to equal the ambient noise level."

The summertime and wintertime L10 sound levels reported above in the ambient sound level surveys suggest that the pre-existing L10 sound levels already randomly exceed the 50 dBA limit approximately 10% of the time during the summer irrespective of the wind conditions. In the winter, the L10 sound level exceeded 50 dBA whenever the wind speed exceeded about 8 m/s (at 10m). These results indicate that, assuming no tonality, the permissible project sound level will be higher than the 50 dBA (5 dBA above the 50 dBA + background level) at times.

2.7.2.1.2 NYSDEC Noise Guidelines

The NYSDEC Program Policy Memorandum, "Assessing and Mitigating Noise Impacts," suggests that new noise level increases that exceed 6 dBA above ambient may result in complaints in sensitive locations or may require additional analysis. The specific language relating to these perceptibility thresholds in the NYSDEC program policy (Section V B(7)c) is a follows:

- *Increases ranging from 0-3 dB should have no appreciable effect on receptors.*

- *Increases from 3-6 dB may have potential for adverse noise impact only in cases where the most sensitive receptors are present.*
- *Sound pressure increases of more than 6 dB may require closer analysis of impact potential depending on existing SPL's [sound pressure levels] and the character of surrounding land use and receptors.*

The above thresholds indicate that cumulative increases in the total ambient sound level of 6 dBA or less are unlikely to constitute an adverse community impact. As discussed in Hessler Associates (2015), from a practical standpoint, because decibels add logarithmically, this threshold means that noise from the project is likely to be considered largely acceptable so long as it does not exceed the existing background level by more than 5 dBA. For example, a background level of 40 dBA plus a project-only sound level of 45 dBA would equal a total cumulative level of 46 dBA – or 6 dBA above the original level. As noted above, the guidelines suggest further evaluation for increases beyond 6 dBA. The guidelines go on to say that "in non-industrial settings the SPL [sound pressure level] should probably not exceed ambient noise by more than 6 dBA at the receptor" but also notes that "there may be occasions where an increase in SPL's of greater than 6 dBA might be acceptable. The addition of any noise source, in a non-industrial setting, should not raise the ambient noise level above a maximum of 65 dBA"

Table 3.3.2 of Appendix N of this SEIS2 (also provided below) summarizes the NYSDEC impact thresholds for each season based on a 6 dBA cumulative increase in the overall sound level. Due to logarithmic addition, a differential of 5 dBA between the baseline background and Project-only sound level leads to a total increase of 6 dBA.

Table 26. Critical Design Levels and NYSDEC Impact Thresholds

Season and Type of Impact	Measured Critical Background Level and Wind Speed	Impact Threshold - Project-Only Sound Level, dBA (5 dBA above Background Level)	Cumulative Sound Level with Project Operating, dBA (6 dBA above Background Level)
Typical Impact Based on Leq Wintertime	44 dBA, 6 m/s	**49**	50
Conservative Impact Based on L90 Wintertime	37 dBA, 6 m/s	**42**	43
Typical Impact Based on Leq Summertime	47 dBA, 10 m/s	**52**	53
Conservative Impact Based on L90 Summertime	43 dBA, m/s	**48**	49

2.7.2.2 Project Sound Levels

Sound levels associated with construction and operation were assessed as part of the 2015 Sound Study (Hessler Associates, 2015). The full results of this study are presented in Appendix N of this SEIS2. A summary of study methodology and results is presented below.

2.7.2.2.1 Construction

Noise from construction activities associated with the Project may temporarily constitute a moderate, unavoidable impact at some homes in the vicinity of the Project. Assessing and quantifying these impacts can be difficult due to the often highly variable nature of construction activities.

In general, the maximum potential noise impact at any single residence might be analogous to a few days to a few weeks of repair or repaving work occurring on a nearby road or to the sound of machinery operating on a nearby farm. More commonly (at houses that are some distance away), the sounds from Project construction are likely to be faintly perceived as the far off noise of diesel power earthmoving equipment characterized by engine revving, back up alarms, gravel dumping and the clanking of metal tracks.

Construction of the Project is anticipated to consistent of several principal activities:

- Access road construction and electrical tie-in line trenching
- Site preparation and foundation installation at each turbine site
- Material and subassembly delivery
- Turbine erection

Table 3.9.1 of Appendix N of this SEIS2 (also provided below) shows the maximum total sound levels due to construction at each turbine site that might temporarily occur at the closest non-participating residences at least 1200 feet away. The individual pieces of equipment likely to be used for each of these phases and their typical noise levels as reported in the *Power Plant Construction Noise Guise* (Empire State Electric Energy Research Corp) were used to construct this table. The distance from a specific construction site to the point where construction noise would drop to 40 dBA is also shown in the table. A bland, steady sound level of 40 dBA is generally considered so quiet (about the sound level in a library) that it is not usually viewed as objectionable even when the background, or masking, sound level is negligible. Unlike for the operational project, wind speed is irrelevant to the background level during the construction phase since there will be times when construction is occurring during calm and quiet periods.

Table 27. Construction Equipment Sound Levels by Phase

Equipment Description	Typical Sound Level at 50 ft., dBA	Est. Maximum Total Level at 50 ft. per Phase, dBA	Max. Sound Level at a Setback Distance of 1200 ft., dBA	Distance Until Sound Level Decreases to 40 dBA, ft.
Road Construction and Electrical Line Trenching				
Dozer, 250-750 hp	88	92	61	5500
Front End Loader, 300-750 hp	88			
Grader, 13-16 ft. blade	85			
Excavator	86			
Foundation Work, Concrete Pouring				
Piling Auger	88	88	57	4200
Concrete Pump, 150 cu yd/hr	84			
Material and Subassembly Delivery				
Off Highway Hauler, 115 ton	90	90	59	4800
Flatbed Truck	87			
Turbine Erection				
Mobile Crane, 75 ton	85	85	54	3400

What the values in this table generally indicate is that, depending on the particular activity, sounds from construction equipment are likely to be significant at distances of up to 5500 feet – which means that construction will occur close enough to many homes within the project area that its noise will be clearly audible. Sound levels ranging from 54 to 61 dBA might temporarily occur at the closest homes to turbine locations over several weeks due to construction activities and somewhat higher levels might be temporarily experienced at homes that are very close to road construction or trenching operations. Such levels would not generally be considered acceptable on a permanent basis or outside of normal daytime working hours (when all project construction is planned), but as a temporary, daytime occurrence construction noise of this magnitude may go unnoticed by many in the project area. For others, project construction noise may be an unavoidable temporary impact. Noise from the very small amount of daily vehicular traffic to and from the current site of construction should be negligible in magnitude relative to normal traffic levels (even given the rural nature of the roads in the project area) and temporary in duration at any given location.

Although not anticipated on this Project, blasting may occasionally be required during Project construction in areas where bedrock is close to the surface and cannot be broken up by other means. More frequently, foundation holes and/or trenches are excavated using backhoes or a pneumatic jack to break up subsoil bedrock. However, if blasting is required, the level of noise generated will be dependent upon technical specifications (size and depth of drilled holes, type and amount of explosive), atmospheric conditions (wind direction, temperature, humidity), and geologic conditions (soil type, bedrock type) (APAO website). In addition, any blasting-related noise will be temporary and infrequent.

2.7.2.2.2 Operational Sound Impacts

Using the design sound power level spectrum for the Vestas V110-2.2 Turbine, sound level contour plots were calculated using the Cadna/A®, noise modeling program version 4.4.145 developed by DataKustik, GmbH (Munich). This software enables the Project area and its surroundings, including terrain features, to be realistically modeled in three-dimensions. Each turbine is represented as a point noise source at a height of 95 meters above the local ground surface (design hub height). The receptor height is set at a standard elevation of 1.5 meters above local grade, which is similar to the elevation at which the ambient background noise levels were measured. The site plan used in the analysis includes 38 turbines despite the fact that only 36 turbines will be installed. The program calculates sound levels in strict accordance with ISO 9613-2 *Acoustics – Attenuation of Sound during Propagation Outdoors*, which is the primary worldwide standard for sound predictions and modeling.

As indicated in Hessler Associates (2015), in order to be as conservative as possible with respect to the assumptions of the model, sound emissions from each turbine are assumed to be the downwind sound level in all directions simultaneously. Although physically impossible, an omni-directional wind is assumed. Using this approach produces a contour plot that effectively shows the maximum possible sound level at any given point. This approach also shows sound levels that cannot possibly occur in some cases – such as between two or more adjacent turbines, since the model effectively assumes that the wind is blowing in two opposing directions. At any given receptor point, the model also assumes the following conservative assumptions:

- Wind Speed – only the critical wind speed nominally produces the plotted contours; under all other wind conditions the impact threshold contour lines would contract closer to the turbines

- Low Ground Porosity – normally wooded areas and farm fields are more absorptive than assumed in the model
- Observer outside – the plotted sound levels occur outside; sound levels inside of any dwelling will be 10 to 20 dBA lower

The model was run to account for four different scenarios, as listed below:

Plot 1 – Typical Impact – Wintertime Conditions
Plot 2 – Conservative Impact – Wintertime Conditions
Plot 3 – Typical Impact – Summertime Conditions
Plot 4 – Conservative Impact – Summertime Conditions

The results of the modeling analysis are displayed in Plots 1 – 4 of Appendix N, and are summarized below:

Plot 1 shows the Project sound levels out to a level of 49 dBA, which represents the 6 dBA cumulative increase threshold recommended by the NYSDEC based on the measured average, or L_{eq}, sound level (44 dBA) during a 6 m/s wind in the wintertime. The region inside the threshold line represents the area where turbine noise might result in an adverse impact relative to the "typical" background level. In this instance, all homes are clearly well outside the 49 dBA threshold line, which occurs fairly close to each turbine and well short of the minimum 1200 foot setback. This plot indicates that no significant adverse impact are expected under typical wintertime conditions.

In **Plot 2** the sound emissions of the project are shown out to 42 dBA, which is the NYSDEC 6 dBA increase threshold if the background sound level during cold weather conditions is taken to be the near-minimum L90 level of 37 dBA. This is the background sound level that occurs for only a small percentage of the time during lulls in the wind and when all sources of man-made noise are at a temporary minimum. This plot is different from Plot 1 in that a number of homes are inside of the nominal impact threshold line. Specifically, there are a total of 4 permanent residences that occur within or on the nominal impact threshold line (Table 28). All 4 of these residences occur within the 42-45 dBA sound range (Plot 1). Of these, 2 residences are Project participants and 2 are non-participants. Under these specific circumstances – wintertime, 6 m/s wind, background level at a minimum – Project noise may be clearly perceptible. For these residents, some degree of adverse reaction is theoretically possible, although it is important to note that this increase in sound level occurs outside – rather than inside homes where most people are most of the time in the winter.

In **Plot 3** the “typical” impact threshold of 52 dBA based on the average (L_{eq}) background level for warm weather conditions is illustrated. All residences are well outside of this theoretical impact threshold, indicating that little or no adverse impact is likely.

Finally, the “conservative” impact during the warm weather months is illustrated in **Plot 4**, based on the L90 background level of 48 dBA measured during the leaf-on, summertime survey. In this case, there are no residences that occur within the 48 dBA impact threshold.

Table 28. Summary of Residences Potentially Impacted by Project Sound Levels

Residence #	Address	Participating Status
233	2317 Meadows Rd. Cassadaga, NY	Participating
387	9566 Center Rd. Fredonia, NY	Participating
232	3085 Cable Rd. Fredonia, NY	Not Participating
231	3088 Cable Rd. Fredonia, NY	Not Participating

This series of plots essentially demonstrates that the project is not expected to generate sound levels above the NYSDEC 6 dBA cumulative impact threshold at residences in the project area during “typical” conditions. It is only during the “conservative” winter scenario when the background sound level is assumed to be at a near-minimum that the State guideline might be temporarily exceeding by 1 or 2 dB at a few residences. However, during the winter, sound emissions from the Project are also less likely to be noticeable, since people tend to be inside more of the time. Moreover, this is fully compliant with the Town’s noise standard.

However, it is also important to note that in the particular case of wind turbines, a cumulative increase in sound level of less than 6 dBA does not indicate that the Project will be inaudible. Operational sound emissions from wind turbines are often unsteady and variable with time largely because the wind does not always blow in a completely smooth and ideal manner. When unsettled air or gusty winds interact with the rotor, or the airflow is not perfectly perpendicular to the rotor plane, a temporary increase in turbulence and noise results. On top of this, turbines often (although not always) produce a periodic swishing sound. These temporal characteristics make operational noise more perceptible than it would be if it were always bland and continuous in nature. Consequently, wind turbines can commonly be discerned at fairly large distances even though the actual sound level may be relatively low and/or comparable to the magnitude of the background level; therefore the possibility of impacts at residences beyond the impact thresholds shown in the plots certainly cannot be ruled out.

Hessler's modeled results represent a worst-case scenario that is based on conservative assumptions. Additionally, considering the Applicant will only construct and operate 36 wind turbines of the overall evaluated 38 turbine site, the number of residences experiencing sound levels in the range of 40 to 45 dBA or greater than 45 dBA may be less than modeled.

In addition to the above acoustic modeling analysis, a modified Composite Noise Rating (CNR) method was utilized to further assess potential community noise impacts relating to the Project. This method takes into account the frequency content of both the background and Project sound levels (as opposed to the A-weighted sound level alone), and is based on case histories of reaction to new noise sources (though not specifically wind turbines). This method has been used by a number of federal agencies including the EPA.

Details of this methodology are described in Appendix N of this SEIS2, but the general procedure for this methodology involves the following steps:

1. Obtain a baseline rating classification, from the predicted sound pressure level spectrum of the new noise source at the point of reception
2. Determine a background (masking noise) correction based on the average measured background sound level spectrum under comparable conditions
3. Apply a number of correction factors related to when the source is in operation, the character of the noise and the general attitude of the receiver
4. Determine a final rating classification that defines the expected reaction to the new source

Results of the CNR analysis are shown in Table 3.6.3 of Appendix N of this SEIS2 and indicate that little or no reaction is expected under most conditions. However, during conservative wintertime conditions (6 m/s wind, bare trees, and background sound levels in a momentary lull) "sporadic" complaints are predicted for receptors with predicted project sound levels in the 38 to 43 dBA range.

The above results are more or less consistent with the NYSDEC relative increase assessment discussed previously, except that the frequency analysis in the CNR method anticipated a significantly lower impact during conservative summer conditions due to elevated background sound levels. While both of these methodologies indicate the possibility of some complaints during the wintertime, it should be emphasized that the modeling is conservative in the following ways:

- Minimal background masking noise, which occurs infrequently, is assumed
- A critical wind speed of 6 m/s is assumed to be blowing – at all other wind speeds the potential intrusiveness of project noise would be less – based on the met tower data a wind speed in the 5.5 to 6.5 m/s range occurs only about 13% of the time
- Any given point is assumed to be simultaneously downwind of every turbine in the project and therefore experiencing a *theoretical* maximum project noise level
- The predicted sound levels occur outside; *interior* sound levels would be substantially lower and most people are inside most of the time in the winter
- A neutral attitude toward the Project is assumed in the CNR calculation.

Furthermore, any potential wintertime impacts would occur only during windy conditions when people are less likely to be outside for any extended period of time. No significant adverse reaction to the Project is predicted by the CNR methodology during summertime conditions when people are more likely to be outside and have their windows open.

2.7.2.2.3 Additional Potential Operational Sound Impacts

The substation associated with the Arkwright Summit Wind Farm is located in an open field about 5 miles west the main project area at the tie-in point to an existing transmission line just north of CR 112 in the Town of Pomfret. Based on first-hand observations and detailed noise modeling analyses of similar substations for other projects, it can be safely said that the sound emissions from the relatively small substations and transformers connected with wind projects of this size are virtually negligible. A slight hum may be audible at times at the fence immediately surrounding such a substation but this sound, including its tonal character, fades out quickly and becomes completely inconsequential at fairly short distances. Highly, if not grossly, conservative modeling analyses for comparable substations typically put the total sound level at a very low level of approximately 35 dBA at 400 ft. Such a sound level is similar to the natural background sound level typically measured in rural areas. The nearest houses to the Arkwright substation are at least 800 ft. away meaning that the substation sound emissions should be insignificant, if they are audible at all. Consequently, no adverse noise impact is anticipated.

With regard to the potential for cumulative noise impacts occurring from nearby wind projects, there are currently no operational commercial-scale wind projects within 35 miles of the proposed Arkwright Summit Wind Project. There is currently one proposed wind project (the Cassadaga Wind Project) in close proximity to the Arkwright Summit Wind Project. However, the northern boundary of the Cassadaga Wind project area is approximately 2 miles due south of the southernmost turbine location of the Arkwright Summit Wind Farm (see Figure 23 of this SEIS2), which represents the shortest possible distance between the two Projects. Consequently, there are no anticipated cumulative noise impacts anticipated between the proposed Arkwright Summit Wind Project and the proposed Cassadaga Wind Project. For more information regarding the proposed Cassadaga Wind Project, please refer to Section 7 of this SEIS2.

2.7.2.3 Low Frequency Noise Concerns

Although concerns are often raised with respect to low frequency or infrasonic noise emissions from wind turbines, modern pitch-regulated wind turbines of the type proposed for this Project do not generate low frequency noise to any significant extent. No impact of any kind, whether related to annoyance or health, is expected from Project-related low frequency noise. Early wind turbines (designed with the blades downwind of the support tower) were prone to producing a periodic thumping noise each time a blade passed the tower, and the widespread belief that wind turbines generate excessive or even harmful amounts of low frequency noise likely originated with this phenomena. While modern wind turbines have been re-configured with blades arranged upwind of the tower, and therefore no longer produce the same magnitude of thumping noises, the myth of excessive low-frequency noise may have perpetuated due to confusion of low frequency sound with the amplitude modulation typical of wind turbines (i.e., the periodic swishing sound with a frequency of about 1 Hz). However, numerous studies show that the low frequency content in the sound spectrum of a typical modern wind turbine – like those proposed for this Project – is no higher than that of the natural background sound level in rural areas (Sondergaard & Hoffmeyer, 2007; Hessler et al., 2008).

Despite this, the issue of potential health effects from wind turbines is the subject of a long-running and on-going debate amongst experts in the wind turbine noise field and a final consensus has yet to be arrived at. Real symptoms have and are being experienced by some residents living in proximity to some wind projects but no plausible link to the sound emissions from the turbines, low frequency or otherwise, has ever been found. In an effort to resolve this conundrum once and for all the Government of Canada (Health Canada, 2015) has recently completed a very extensive epidemiological study using both self-reported and objectively measured health outcomes to impartially investigate and quantify the prevalence of health effects and health indicators among a large sample of residents living within 11 km of wind projects. In general, it was found that there was no statistically significant exposure-response relationship between wind turbine noise and such factors as sleep disturbance, sleep disorders, migraines, dizziness, diabetes, hypertension, hair cortisol concentrations, blood pressure, resting heart rate, perceived stress or any measure of quality of life. In many cases worse or more prevalent symptoms, such as sleep disturbance, for instance, were reported by residents living far away from any turbines.

Additional recent studies, such as Howe (2015) and Tonin (2015), suggest a psychosomatic origin for what appear to be legitimate and very real symptoms. In the Tonin (2015) study, volunteers were split into two groups and exposed in a double blind experiment to (inaudible) infrasonic sound through special headphones and queried afterwards for their reactions. Prior to the test one group was given internet articles describing the supposed adverse effects of low frequency wind turbine noise while the other group was given different articles asserting that there is no significant impact from such sound. The results show, at least for the short-term exposures in the study, that those who were preconditioned to believe there would be an adverse effect reported them to a statistically significant extent while no effect at all was observed by the other group.

Concerns over potential health effects associated with low-frequency noise are also included in Section 2.10.2.2.8 of this SEIS2.

2.7.3 Mitigation

2.7.3.1 Project Construction

Although impacts related to construction noise will be temporary, and are not anticipated to be significant, measures employed to minimize and mitigate temporary construction noise shall include:

- Implementing best management practices for sound abatement during construction, including use of appropriate mufflers and limiting hours of construction.
- Notifying landowners of certain construction sound impacts in advance (e.g., if blasting becomes necessary).
- Implementing a complaint resolution procedure to assure that any complaints regarding construction sound are adequately investigated and resolved (see Section 4.1 of this DEIS for additional information).

2.7.3.2 Project Operation

While the possibility of adverse reactions from some residents in the Project area cannot be ruled out, actual Project sound levels are expected to be lower than those predicted by the models for the majority of the time. Sound modeling indicates overall increases of less than 6 dBA at the majority of receptors in the study area during the majority of the year. Furthermore, the modeling analysis indicated that full compliance with local law relating to wind energy facilities is expected. The maximum allowable sound level of 50 dBA is predicted to occur well short of any residence or potentially sensitive receptor. Therefore, it is not anticipated that sound will be a potential significant adverse impact. Despite these findings, the Applicant understands that turbine noise will be audible and can be a source of annoyance to certain receptors, under certain conditions. Consequently, the Applicant has committed to the following, as necessary:

- Offering a good neighbor agreement and corresponding payment to landowners with occupied residences, which would fall within the 41 dBA nominal impact threshold line, based on the final wind turbine layout as presented in the Project FEIS. There are only 4 residences that fall within or on this threshold line per the SEIS2 Project layout, 2 of which are Project participants.
- Implementing the complaint resolution program (set forth in Appendix O of this SEIS2) whereby neighboring residents (or others) can contact the Applicant with their concerns. Such complains will be logged and investigated in order to resolve the identified issue.
- Complete sound testing after commissioning to ensure wind turbines are meeting the manufacturer's noise specifications.

The SEIS2 Project layout evaluated in this Noise assessment differs from the layout that was evaluated in the noise assessment presented in the SEIS with respect to the number of turbines, the location of the turbines, and the proposed turbine model. Consequently, the noise impacts associated with the Project layout presented in this SEIS2 are considerably different than those associated with the layout Presented in the SEIS. The most dramatic difference between the current SEIS2 Project layout and the layout presented in the SEIS is the removal of seven turbines in the southeastern portion of the Project Site. This change has resulted in a significant reduction in the overall noise of the Project. Furthermore, while the turbine model that is was evaluated for this SEIS2 layout (Vestas V110-2.2 MW) is larger than the model evaluated for the SEIS (Sulzon S 88), due to advances in noise reduction technologies, the two models generate similar sound levels throughout the 4 m/s – 11 m/s range of wind speeds.

2.8 TRAFFIC AND TRANSPORTATION

2.8.1 Existing Conditions

The existing conditions of the transportation infrastructure in the vicinity of the Project Site are as described in Section 2.8.1 of the DEIS. The revised SEIS2 Project layout remains predominately located within the Town of Arkwright, as shown in Figure 2 of this SEIS2. The Project Site is generally bounded by Straight Road to the north, Putnam and Farrington Hollow Roads to the east, Park and Miller Roads to the west and Route 72 to the south.

It is stated in the DEIS that the primary transportation route to access the Project Site is Route 83. However, analysis performed subsequent to the preparation of the DEIS (discussed below) indicates that for the purpose of delivering wind turbine components, the Project Site should be accessed from the south and east, using a combination of Highways 60, 20, 39, and County Route 79. This delivery route will accommodate the over-sized (length, height, or weight) delivery vehicles/loads required for delivery of wind turbine components. Using this delivery route will require special hauling permits from the New York State Department of Transportation (NYSDOT), which will be obtained prior to construction. Upon selection of a construction contractor and turbine delivery company for the Project, access routes will be re-evaluated to confirm that these routes minimize the impact to the community.

Subsequent to the preparation of the Transportation Assessment by URS Corporation in 2008, which was included as Appendix I of the DEIS, an additional Transportation Route Review was completed in 2015 by ATS, Inc., which is included as Appendix P to this SEIS2. The 2015 transportation review utilized the dimensions of the Vestas V-110 turbine components and the requisite delivery equipment to determine the most feasible delivery route to the location of the Project. The 2015 transportation review proposed that the delivery vehicles pick up the turbine components in Oswego, NY, and head south on Highway 104, I-81, and I-481 until they reach I-86 in Binghamton, NY. The vehicles would then approach the Project from the east, along I-86, which runs approximately 25 miles south of the Project. The delivery vehicles would exit I-86 in Jamestown, NY and head north on Highway 60 until they reach the intersection with Highway 20. The delivery vehicles would then head east using a combination of Highways 20 and 39 until finally heading south on County Route 79 to the Project vicinity (see Figure 12 of Appendix P of this SEIS2). Within the Project vicinity, construction and delivery vehicles are anticipated to travel over select public roadways, as well as new, private access roads specifically constructed to access turbine locations.

2.8.2 Anticipated Impacts

2.8.2.1 Construction

Impacts to traffic and transportation resulting from Project construction remain generally unchanged since the preparation of the DEIS and SEIS. In addition to construction vehicles such as gravel trucks, concrete trucks, and tractor trailers, the delivery of wind turbine components to Project construction sites will require the use of specialized flatbed trucks, which are generally larger and heavier than typical tractor trailer combinations. Consequently, the movement of Project construction and delivery vehicles has the potential to result in adverse impacts to the road surfaces and periodic traffic delays.

Impacts to local transportation infrastructure are also anticipated to result from road improvements which will likely be necessary in some locations to accommodate Project construction vehicles. In some cases, such improvements will involve the widening of intersections to accommodate the turning radii of the vehicles used to transport the turbine components. The 2015 transportation review investigated areas along the proposed delivery route that would likely need improvements to accommodate the oversized delivery vehicles. The suggested improvements to the entire proposed delivery route are described in Appendix P of this SEIS2 and summarized below.

Suggested Improvements Along the Entire Proposed Delivery Route:

- Junction E 2nd St. on to E Cayuga St. and E Cayuga St. on to E 1st St: In the City of Oswego, NY. (Two turns back to back): For both turns, selected obstacles including some trees and a traffic signal pole will need to be removed/relocated. Additionally, parking restrictions will need to be put in place to ensure a proper turning radius for the delivery vehicles.
- Junction E 1st St. on to Highway 104 in the City of Oswego, NY: Obstructions including some traffic signs and planted trees will need to be removed/relocated to ensure proper turning radius for the delivery vehicles.
- Junction Highway 104 and I-81: Obstructions will need to be removed from the blade tip swing area (including signs, tree branches and other vegetation).
- Junction Highway 60 to Highway 60: In the Town of Gerry, NY, the transport must turn left to stay on Highway 60. A stop sign and a “Highway 60” sign at this junction will need to be relocated to accommodate the delivery vehicles.
- Junction Highway 39 to County Route 79: The transport will need to turn right on to County Route 79. This will require the removal/relocation of multiple obstacles at this intersection including a stop sign, guardrail, and some trees. The inside corner of the turn will need to be filled and compacted to provide proper turning area for the delivery vehicles.
- County Route 79 is a narrow two-lane road with no shoulders and passing areas. Traffic control will be critical to allow for safe transport of the delivery vehicles. Additionally, part of County Route 79 is load posted with a six ton axle weight limit from March 1 to May 31. The County should be contacted to confirm access.
- Junction County Route 79 and Highway 83: There is a hump in the road where Highway 83 intersects County Route 79. The hump may need to be reduced. Fill could be added before and after the intersection to prevent the loads with minimal ground clearance from becoming high centered.

2.8.2.2 Operation

Operation-related transportation impacts associated with the Project are as described in the DEIS and SEIS.

The wind turbines have been sited to avoid obstructions to airspace safety and navigation in accordance with FAA regulations. To minimize potential visual effects associated with FAA warning lights on the night sky, the Applicant has submitted a request to FAA that only 8 of the 38 proposed turbines sites be required to be lit. The FAA has not yet issued Determinations of No Hazard for the proposed 38 turbine locations under consideration in the SEIS2 Project layout. The Applicant will continue to consult with FAA to ensure that the minimum number of FAA lights to ensure safe aviation and navigation are required. Per FAA regulations, the final site locations will be submitted to the FAA for final approval within six months of construction.

2.8.3 Proposed Mitigation

2.8.3.1 Construction

Mitigation measures for anticipated potential impacts to traffic and transportation resulting from Project construction are as described in Section 2.8.3.1 of the DEIS. The DEIS contains possible mitigation measures designed to eliminate or minimize any potential impacts to local transportation and traffic should they occur during construction. The final transportation routes will be designed to avoid/minimize safety issues associated with the use of the approved delivery route, which will confine the heavy truck travel to a few selected roads. The Applicant will repair any adverse impacts to roads resulting from construction-related transportation within the approved delivery route in accordance to the Host Community Agreement between the Applicant and the Town of Arkwright and the Road Use Agreement with the County. Prior to construction, the specific terms of road use and reconstruction will be negotiated and memorialized in a Road Agreement between the Applicant and road owner.

As stated in the DEIS, it is anticipated that the wind turbine component delivery vehicles will require an NYSDOT Superload permit (type 1s) due to their larger dimensions. Police escorts are required for all superloads. Upon issuance of a final permit, the Applicant will contact Police to make arrangements at least two (2) business days prior to scheduled deliveries. The Applicant will make arrangements for all necessary escorts, equipment, personnel or other items that must accompany the delivery vehicles. All escort drivers involved in the delivery shall have a valid Certified Escort license and driver's license. All public road upgrades that may be required to accommodate construction vehicles will be identified, including placement of steel plates or gravel to road surfaces, widening roadways, reconfiguring intersection geometry to accommodate the turning radius of over-sized vehicles, and identifying the drainage structures, pipes, and culverts that require improvement to accommodate the construction related traffic.

2.8.3.2 Operation

There are no anticipated long-term impacts to traffic and transportation resulting from Project operation. Consequently, no mitigation measures for long-term impacts to traffic and transportation are necessary.

2.9 SOCIOECONOMICS

2.9.1 Existing Conditions

2.9.1.1 Population and Housing

Since the release of the DEIS and SEIS, new census data has been made available, allowing for an updated assessment of demographics within the vicinity of the Project area.

The estimated population of Chautauqua County in 2014 was 132,053. Between April 1, 2010 and July 1, 2014, the population of Chautauqua County decreased by 2.1 %. (U.S. Census Bureau, 2015). The 2010 populations of the Towns of Pomfret and Arkwright were 14,965 and 1,061 respectively. The Village of Fredonia, which is within the Town of Pomfret, had an estimated population of 11,230 in 2010. Compared to the 2000 U.S. Census data, the population of the Town of Pomfret increased by 1.8%, the population of the Town of Arkwright decreased by 5.8%, and the population of the village of Fredonia increased by 5.8%.

Housing data for Chautauqua and County and each municipality within the Project area for 2013 are presented in Table 29. From these data, the Town of Pomfret had the highest number of housing units with 6,345, of which 5,375 (84.7%) were occupied and 970 (15.3%) were vacant. Of the 54,863 occupied housing units in Chautauqua County, 37,903 (69.1%) were owner occupied, and 16,960 (30.9%) were renter occupied.

Table 29. County and Municipality Housing Units, 2013

County and Town	Occupied Housing		Vacant housing		Rental Vacancy Rate	Total Housing Units
	Number	Percentage	Number	Percentage		Number
Chautauqua County	54,863	82.2	11868	17.8	7.5	66,731
Town of Arkwright	412	77.2	122	22.8	0	534

Town of Pomfret	5,375	84.7	970	15.3	11.2	6,345
Village of Fredonia	3,926	86.6	607	13.4	12.5	4,533
Source: U.S. Census Bureau, 2009-2013 5-year American Community Survey						

2.9.1.2 Property Values

Property value data for the State of New York, Chautauqua County, and each municipality within the Project area for 2013 are presented in Table 30. From these data, the median value of housing units in the Town of Arkwright ($93,300) was similar to that of Chautauqua County ($83,500). The median value of housing units in the Town of Pomfret ($124,400) and the Village Fredonia ($129,200) were considerably higher than that of Chautauqua County. All of these values are considerably lower than the median value of housing units in New York State, which was $288,200 in 2013.

Table 30. State, County, and Municipality Median Housing Values, 2013

State, County, and Town/Village	Median Housing Value
State of New York	$288,200.00
Chautauqua County	$83,500.00
Town of Arkwright	$93,300.00
Town of Pomfret	$124,400.00
Village of Fredonia	$129,200.00
Source: U.S. Census Bureau, 2009-2013 5-year American Community Survey	

2.9.1.3 Economy and Employment

According to the U.S. Census Bureau (2013), the largest industry in Chautauqua County in 2013 was educational, health care, and social services with 28.2% of all workers employed in this sector. The next largest industries were manufacturing and retail trade, employing 16.3% and 11.6% of the Chautauqua County workforce respectively. The unemployment rate in 2013 for Chautauqua County was 5.2%.

The educational, health care, and social services industry was the largest industry in terms of number employed in the towns of Arkwright (26.5%) and Pomfret (42.1%), and the Village of Fredonia (44.6%) in 2013. The second and third largest industries in the Town of Arkwright were manufacturing (20.7%), and retail trade (8.0%). The second and third largest industries in the Town of Pomfret were retail trade (11.3%), and arts, entertainment, recreation, accommodation, and food services (10.1%). The second and third largest industries in the Village of Fredonia were retail trade (12.4%), and arts, entertainment, recreation, accommodation, and food services (12.0%).

The agriculture, forestry, fishing, hunting, and mining industries accounted for 2.5% of the total employment in Chautauqua County in 2013. These industries accounted for 6.8% and 0.9% of employment in the Towns of Arkwright and Pomfret respectively. According to the United States Census of Agriculture, there were a total of 1,515 farms that encompassed 236,546 acres or 35.1% of the land in Chautauqua County. In 2012, the estimated average market value of land and buildings per farm was $322,390 in Chautauqua County and $525,587 in New York State (USDA Census of Agriculture, 2012). Despite agriculture accounting for a small percentage of employment in Chautauqua County, agriculture contributes heavily to the local economy. The County is ranked second in the state for the production of fruits, tree nuts, and berries, twelfth in the state for the production of cattle and calves, and thirteenth in the state for the production of diary. Chautauqua County is also a significant producer of wine grapes, and devotes more acres to their production than any other New York State County. In 2012, the market value of all agricultural goods sold was $161,849,000 for Chautauqua County, which ranks the County at eleventh in New York State.

2.9.1.4 Municipal Budgets and Taxes

The local taxing jurisdictions in the Project area include Chautauqua County, The Towns of Arkwright and Pomfret, and the Village of Fredonia. According to the New York State Office of Real Property Tax Services (NYSORPTS) Municipal Profile data, the total 2013 property tax levy for Chautauqua County was $61,112,120, with $620,004 coming from the town of Arkwright and $5,689,489 coming from the Town of Pomfret and the village of Fredonia. The real property tax levies for the Towns of Arkwright and Pomfret were $452,518 and $1,077,671 respectively. The real property tax levy for the village of Fredonia was $2,686,982. The 2013 real property tax levies for the Cassadaga Valley, Forestville, Fredonia, and Pine Valley School Districts were $267,099, $654,840, $257,950, and $47,537 for the portion of each district with the Town of Arkwright. A real property tax levy of $12,715,522 was levied upon the Town of Pomfret for the Fredonia School District in 2013. (NYSORPTS 2013).

The current sales tax rate in Chautauqua County is 7.5%. The total sales tax revenue for Chautauqua County in 2013 was $56,322,464. The sales tax revenue in 2013 for the Towns of Arkwright and Pomfret was $197,820 and $794,166 respectively. The Village of Fredonia accrued $1,699,035 of sales tax revenue in 2013. (New York State Office of the Comptroller 2013). Table 31 summarizes budgets for 2013 at the Town, Village, and County levels within the Project area, including the Forestville, Pine Valley, Fredonia, and Cassadaga Valley School Districts.

Table 31. County and Municipal Budgets, 2013

Taxing Jurisdiction	Total Revenue	Total Expenditure	Total Indebtedness
Chautauqua County	$295,380,678	$301,968,574	$6,587,896
Town of Arkwright	$805,201	$881,459	$76,258
Town of Pomfret	$4,309,262	$7,168,081	$2,858,819
Village of Fredonia	$10,604,240	$10,186,920	$0
Forestville School District	$20,461,406	$11,518,532	$0
Pine Valley School District	$16,054,500	$16,325,285	$270,785
Fredonia School District	$28,358,358	$28,489,575	$131,217
Cassadaga Valley School District	$20,379,087	$20,390,427	$11,340

Source: New York State Office of the State Comptroller, 2013

2.9.2 Anticipated Impacts

An economic impacts analysis was prepared in 2008 by Camoin Associates in support of the SEIS (see SEIS Appendix I). Although many of the findings and conclusions presented in that report remain valid, due to the amount of time that has elapsed since the SEIS and the revisions to the Project layout, an updated economic impact analysis has been prepared using the Job and Economic Development Impact (JEDI) model (Version 12.13.14). The JEDI model was developed by the National Renewable Energy Laboratory (NREL), a facility of the Unites States Department of Energy. The JEDI model requires project-specific data input (such as year of construction, size of project, turbine size and location), and then calculates the impacts described above through the use of state-specific multipliers. These multipliers account for the change in jobs, earnings, and output likely to occur throughout the local, regional, and statewide economy as a result of Project-related expenditures. The resulting data are paired with industry standard values (e.g., wage rates) and data reflecting personal spending patterns (e.g., percent of household income dedicated to housing expenditures) to calculate on-site, supply chain, and induced impacts (USDOE NREL, 2015). This model allows impacts to be estimated for both the construction and operation phases of the proposed development. An economic impact analysis was performed for a commercial wind farm scheduled to begin construction in 2016 with a rated capacity of 78.6 MW and an assumed 33 turbines at 2.2 MW and 3 turbines at 2.0 MW. The results of this analysis are illustrated in Table 32, below, and summarized in the narrative that follows.

Table 32. Local Economic Impacts

During Construction Period	Jobs	Earnings	Output
Project Development and Onsite Labor Impacts	62	$4.90	$5.20
Construction and Interconnection Labor	58	$4.50	
Construction Related Services	4	$0.40	
Turbine and Supply Chain Impacts	158	$12.5	$30.3
Induced Impacts	87	$6.6	$15.5
Total Construction Impacts	306	$23.9	$51.1
During Operating Years (Annual)	Jobs	Earnings	Output
Onsite Labor Impacts	5	$0.40	$0.40
Local Revenue and Supply Chain Impacts	4	$0.40	$1.30
Induced Impacts	4	$0.30	$0.50
Total Annual Operational Impacts	13	$1.10	$2.20

Notes: Earnings and Output values are millions of dollars in 2015 dollars. Totals may not add up due to independent rounding. Results are based on model default values.

Source: NREL JEDI Model (Version W10.13.14) (USDOE NREL, 2015)

2.9.2.1 Construction

2.9.2.1.1 Population and Housing

Anticipated potential impacts to population and housing resulting from Project construction are as described in Section 2.9.2.1.1 of the DEIS.

2.9.2.1.2 Property Values

Anticipated potential impacts to property values resulting from Project construction are as described in Section 2.9.2.1.2 of the DEIS.

2.9.2.1.3 Economy and Employment

Based on the results of the JEDI model described in Section 2.9.2 of this SEIS2 (Table 32), construction of the Project is anticipated to generate 306 jobs. Of these, 62 are on-site construction and project development jobs, 158 are turbine manufacturing and supply chain jobs, and 86 are jobs that result from induced demand through the spending of additional household income. The total impact of 306 new jobs would result in approximately $23,900,000 of earnings, assuming a 2016 construction start and wages consistent with statewide averages. Local employment would primarily benefit those in the construction trades, including equipment operators, truck drivers, laborers, and electricians. Project construction will also require workers with specialized skills such as crane operators, turbine assemblers, specialized excavators, and high voltage electrical workers. It is anticipated that many of the highly specialized workers will come from outside the area and will remain for only the duration of construction.

In addition to jobs and earnings, the construction of the Project is expected to have a positive impact on economic output, a measurement of the value of goods and services produced and sold by backward-linked industries. Economic output provides a general measurement of the amount of profit earned by manufacturers, retailers, and service providers connected to a given project. The value of economic output associated with Project construction is estimated to be $51,100,000. Between workers' additional household income and industries' increased production, the impacts associated with the Project are likely to occur throughout many different sectors of the statewide economy.

2.9.2.1.4 Municipal Budgets and Taxes

As described in Section 2.9.2.2.1 of the DEIS, during construction the Project will not adversely impact municipal budgets and taxes. During construction, Project personnel will have a temporary positive impact on local sales and service-related tax revenue for the local municipalities.

2.9.2.2 <u>Operation</u>

2.9.2.2.1 Population and Housing

Anticipated potential impacts to population and housing resulting from Project operation are as described in Section 2.9.2.2.1 of the DEIS.

2.9.2.2.2 Property Values

Subsequent to the issuance of the DEIS and SEIS, there have been a number of more recent studies conducted to further evaluate the impacts of wind facilities on property values.

The Lawrence Berkeley National Laboratory's report *The Impact of Wind Power Projects on Residential Property Values in the United States: A Multi-Site Hedonic Analysis,* was released in December 2009. A more broad approach to assessing potential impacts on property values of residences near wind facility projects was undertaken for this study and consequently it is the “most comprehensive and data-rich analysis to date in the U.S. or abroad on the impacts of wind projects on nearby property values” (Hoen et al., 2009). This study’s analysis is based on information from 10 communities surrounding 24 existing wind power facilities spread across nine states. The study included the Fenner Wind Farm and Waymart Wind Farm (total turbine blade tip height 328 feet) in Wayne County, Pennsylvania, two facilities that are comparable in terms of land use and rural condition to the Arkwright Summit Wind Farm. While the Fenner Wind Farm is a considerably smaller Project, the study area is similar in composition and land use. Homes included in the study were located from 800 feet to over five miles from the nearest wind energy facility. This study used a methodology based on the hedonic pricing model to identify the marginal impacts of different housing and community characteristics on residential property values. Analysis of possible impacts on property values was undertaken by dividing the impacts into three non-mutually exclusive categories, area stigma, scenic vista stigma, and nuisance stigma. Area stigma may occur regardless of whether the wind facility is within view of the home. The mere fact that a wind facility is generally nearby may adversely affect a home’s value. Scenic vista stigma is based on the concern that a home may be devalued because a wind facility is within view and/or interrupts an existing scenic vista. A nuisance stigma can occur because of the potential for extenuating factors from a nearby wind facility, such as noise or shadow flicker (regardless of whether they actually occur). Exploration of the effects of all three stigmas resulted in finding no persuasive evidence that neither the view of the wind facilities nor the distance of the home to the facilities is found to have any significant effect on home sales prices. The study recognizes the possibility that the value of an individual home (or small numbers of homes) has been or could be negatively impacted by a nearby wind facility (Hoen et al., 2009). However, even if such occurrences do exist “they are either too small or too infrequent to result in any widespread, statistically observable impact” (Hoen et al., 2009).

As previously mentioned, Hoen et al. (Hoen et al., 2009) categorized three types of wind turbine stigmas that could affect property values. In a site-specific study conducted in Ford and McLean County, Illinois, Hinman (Hinman, 2010) formalized a fourth stigma, wind farm anticipation stigma. This stigma decreases property values due to the uncertainty surrounding where turbines will be placed and what effect the wind facility will have on area residents when the development is initially proposed. The study examined 3,851 residential property transactions from 2001 through 2009 (Hinman, 2010). The study found that when the 240-turbine wind facility was initially announced, property values near the prospective wind facility decreased compared to elsewhere in the county. However, after the wind facility entered the operational stage, property values near the wind facility increased faster than those located elsewhere in the county. The turbines considered in this study are 398 feet from base to blade tip.

A property value study in the vicinity of Mendota Hills Wind Farm (62 wind turbines, turbine height to blade tip 297 feet), GSG 1 Wind Farm (40 wind turbines, approximately 399 feet to blade tip), and Lee-Dekalb Wind Center (145 wind turbines, turbine height to blade tip 388 feet) within Lee County, Illinois also examined the wind farm anticipation stigma (Carter, 2011). The study examined 1,298 real estate transactions from 1998 to 2010. The study suggests that following announcement of the wind project, property values near the proposed wind facility initially decline. However the analysis indicates that residential properties located near wind turbines in Lee County have not in fact been negatively affected by the installation of a wind energy facility. Assuming the wind facility is appropriately sited using modern, industry standard setbacks, and that it minimizes impacts to nearby residences, property values eventually rebound once the uncertainty surrounding how homeowners are affected by the development disappears. The study acknowledges one shortcoming of property value studies, which is that the results presented are not able to state anything about whether being in close proximity to a wind facility affects the ease of selling a home. It could be that homes near wind turbines are not for sale or selling and consequently would not be included in the studies evaluating real estate transaction data (Carter, 2011). However, the Hoen et al. (Hoen et al., 2009) study estimated a sales volume model and concluded that sales volumes did not decrease with wind energy development.

Heintzelman and Tuttle (2011) examined 11,331 property transactions (including agricultural property) over nine years in Northern New York to explore the effects of new wind facilities on property values. These properties are within Lewis, Franklin, and Clinton Counties. However, only 461 transactions occur within three miles of a wind turbine. The study examined 194 turbines (height to blade tip 395 feet) in Lewis County, which occur on top of a large plateau, as well as 85 turbines in Franklin County and 186 turbines in Clinton County (turbine height to blade tip 390 feet), which occur within a broad river valley with small hills. Similar to the Hoen (2006), Hoen et al. (2009), Hinman (2010), and Carter (2011), the study found that in Lewis County turbines appear to have had little effect, or in some instances a positive effect. In contrast, property values in Clinton and Franklin Counties were negatively impacted by nearby wind energy facilities, with the magnitude of this effect dependent on the distance between homes and the nearest turbine. For Franklin and Clinton Counties, properties within 0.5 mile experienced an 8.8% to 15.8% decline. At a range of three miles the decline is between 2% and 8%. The study states that in Lewis County, landowners appear to be receiving sufficient compensation to prevent a decline in property values. In addition, the Clinton and Franklin County projects became operational in 2008 and 2009, at the very end of the nine year study period, while the Lewis County project became operational in 2006, resulting in a much larger set of property sales and thus, more robust analysis (Heintzelman & Tuttle, 2011).

Public opinion and perception seem to indicate that the presence of wind turbines diminish property values. However, numerous property value studies based on statistical analysis of real estate transactions have found that wind facilities have no significant impact on property values (Sterzinger et al. 2003; Hoen 2006; Hoen et al. 2009; Hinman 2010; Carter 2011).

2.9.2.2.3 Economy and Employment

The economic and fiscal impact study included as Appendix I of the SEIS provides a discussion of the employment opportunities and annual revenues that are anticipated to result from the Project. The report concludes that economic and employment contributions that will result from the Project will include annual wages, annual royalty payments, annual payment-in-lieu of taxes (PILOT) payments, annual community host payments, annual sales tax revenue, and annual fire district payments. In addition, the total revenue from the Project may be greater due to additional revenue in the form of neighbor agreements that were not included in the study.

Based on the results of the JEDI model (Table 32), Project operation and maintenance are estimated to generate five full-time equivalent jobs with estimated average annual earnings of $400,000. These five jobs comprise the Project's long-term employment impact, and will include a Site Manager, Wind Technicians, and administrative personnel. Project wage rates are consistent with statewide averages, and are estimated to range from $13 to $20 for administrative personnel, to around $32 per hour for facility management.

The operation and maintenance of the Project will also generate new jobs in other sectors of the economy though supply chain impacts and the expenditure of new and/or increased household earnings. Increased employment demand throughout the supply chain is estimated to result in approximately four jobs with annual earnings of around $400,000. Additionally, it is estimated that four jobs with associated annual earnings of $300,000 will be induced through increased household spending associated with Project operations. In total, while in operation, the Project is anticipated to generate demand for 13 jobs with annual earnings of approximately $1,100,000. Total economic output will likely increase by an estimated $2,800,000 as a result of Project operations and maintenance.

2.9.2.2.4 Municipal Budgets and Taxes

The Project is anticipated to have a positive effect on municipal budgets and tax revenues. The economic and fiscal impact study included as Appendix I of the SEIS provides a breakdown of the estimated revenues to local taxing jurisdictions from the Payment in Lieu of Taxes (PILOT) and Community Host Agreements from the Project, as well as estimated revenues from sales taxes on the additional spending on local goods and services. The Applicant is currently determining the specifics of a PILOT program and community host agreements in consultation with the

Chautauqua County Industrial Development Authority (CCIDA), the Towns of Arkwright and Pomfret, and local taxing jurisdictions.

2.9.3 Proposed Mitigation

2.9.3.1 Construction

2.9.3.1.1 Population and Housing

As described in Section 2.9.3.1.1 of the DEIS, construction of the Project is not anticipated to have a significant impact on local population and housing. Consequently, no mitigation is necessary to address these impacts.

2.9.3.1.2 Property Values

Construction of the Project is not anticipated to have a significant impact on local property values. Consequently, no mitigation is necessary to address these impacts.

2.9.3.1.3 Economy and Employment

As described in Section 2.9.2.1.3 of this SEIS2, construction of the Project will have a short-term beneficial impact to the local economy and employment. Therefore, no mitigation measures are necessary.

2.9.3.1.4 Municipal Budgets and Taxes

Mitigation measures for potential impacts to local municipal budgets and taxes resulting from Project construction are as described in Section 2.9.3.1.4 of the DEIS.

2.9.3.2 Operation

2.9.3.2.1 Population and Housing

Operation of the Project is not anticipated to adversely affect population or housing availability in the local Towns or surrounding area. Consequently, mitigation measures to address population and housing impacts are not necessary.

2.9.3.2.2 Property Values

As described in Section 2.9.2.2.2 of this SEIS2, there are no anticipated impacts to long-term property values as a result of Project operation. Consequently, no additional mitigation is necessary.

2.9.3.2.3 Economy and Employment

As described in Section 2.9.3.2.3 of this SEIS2, all anticipated impacts from Project operation on the local economy and employment are positive. Consequently, mitigation measures will not be necessary.

2.9.3.2.4 Municipal Budgets and Taxes

As described in Section 2.9.3.2.4 of the DEIS, because operation of the proposed Project would not create a significant demand for municipal or school district services and facilities, it would not have adverse impact on municipal or school budgets. The Applicant proposes to negotiate a PILOT agreement with the CCIDA through which affected taxing jurisdictions would receive revenues. The exact terms of the PILOT agreement have not been finalized. In addition, the Applicant anticipates entering into a host community agreement with the Towns where Project facilities are proposed. The terms of these host community agreements have not been determined; however, such agreements often include payments to host municipalities. PILOT payments have typically lasted for 10 to 20 years for wind and other energy generation facilities, while the host community payments generally last for the life of the Project.

After the PILOT agreement expires, the facilities would be taxed at their assessed values. These payments would more than offset any minor increases in community service costs that may be associated with long-term operation and maintenance of the Project (e.g., slightly increased road maintenance costs). Because the wind facility would generate a predictable source of additional revenue for all of the affected municipalities and school districts over at least the next 20 plus, the Project would positively impact municipal and school district revenues.

2.10 PUBLIC SAFETY

2.10.1 Existing Conditions

The scope of existing public health and safety conditions considered in this section remains as described in Section 2.10.1 of the DEIS.

2.10.1.1 Gas Infrastructure

Existing conditions of gas infrastructure in the vicinity of the Project are as described in Section 2.10.1.1 of the DEIS. The locations of existing gas wells within the vicinity of the Project were identified in the SEIS, and are included in the SEIS2 (Figure 7).

2.10.1.2 Transportation

Existing transportation routes and infrastructure in the vicinity of the Project area are as described in Section 2.10.1.2 of the DEIS.

2.10.1.3 Electrical

Existing conditions of electrical infrastructure in the vicinity of the Project are as described in Section 2.10.1.3 of the DEIS.

2.10.1.4 General Wind Energy Facility Concerns

Wind generated power is in many ways safer than other forms of electricity generation. Unlike conventional power plants, wind farms produce energy without emitting pollutants that decrease air quality. This is a major public health benefit since the effects of air pollution are widespread. Power generation with wind also largely avoids risks associated with leaks and explosions of flammable, hazardous materials that are inherent with fossil fuel combustion. Use of hazardous materials is minor at wind farms, so spills of toxic liquids are likely to be both rarer and smaller than at conventional power plants.

Production of power from wind farms, however, is not completely without risk to the public. Unlike fossil fuel power plants that have one central location, wind farms are designed with turbines spread over a larger area. Although the wind turbines will be located on leased private land, this configuration provides more opportunity for the public to access the turbines, and the probability of accidents increases with increased public access. Ice shedding, tower collapse, blade failure, stray voltage, and fire in the turbines are all possible, though setbacks from dwellings, roads, and other facilities make injuries from these types of accidents more rare.

Since publication of the DEIS in 2008, more recent statistics regarding fatalities from wind energy projects have been compiled. Whereas in 2008 there had been 18 recorded deaths in the United States, as of 2013 there had been 27.

Most of these fatalities were workers involved with construction or maintenance and operation. Falls from turbines and accidents involving vehicles around the construction site have been the most common. For example, in 2010 a construction worker was killed when a bulldozer rolled over on him. In 2011, a man died when he fell to the ground after the rotor started turning and snagged the crane boom that held the basket he was in. In the United States, accidents involving members of the public have been rare. In one unfortunate case, a high school student was killed when he fell from a turbine after climbing it as a prank. In another incident, also reported in the DEIS, a crop duster pilot struck a guy wire on a meteorological tower. There have been no incidents of ice shedding causing fatalities in the United States (Gipe, 2013).

Wind energy has become safer to workers and the general public in the years since the DEIS. Death per terawatt hour (TWh) is a measure of how safe a given form of energy production is; from 2008 to 2012, deaths per TWh from wind farms has decreased from 0.045 to 0.032 (Gipe, 2013).

Other information in the DEIS regarding general wind energy facility concerns is as described in Section 2.10.1.3 of the DEIS.

2.10.2 Anticipated Impacts

2.10.2.1 <u>Construction</u>

Anticipated potential impacts to public safety from construction of the Project are as described in Section 2.10.2.1 of the DEIS. As discussed in Section 2.1 (Geology, Topography, and Soils) of this SEIS2, the Applicant is in the process of determining whether blasting may be necessary at some turbine locations, foundations for Switchyard, Project substation, underground collection lines and Generator Lead Line foundations (due to the potential presence of shallow bedrock). Potential health and safety impacts associated with blasting are discussed below.

2.10.2.1.1 Fire or Explosion

Anticipated potential impacts relating to the risk of fire or explosion from construction of the Project are as described in Section 2.10.2.1.1 of the DEIS. The revised 36 turbine layout adheres to the 500-foot setback from gas well infrastructure. The Applicant continues to discuss locations of underground wells and appropriate setback and safety measures with gas well operators and owners.

2.10.2.1.2 Release or Potential Release of Hazardous Materials

Anticipated potential impacts to public safety resulting from the release or potential release of hazardous materials from Project construction are as described in Section 2.10.2.1.2 of the DEIS, which indicates that potential for release of hazardous materials is mainly due to presence of small amounts of fuel, coolants, and lubricants present on the Project site. These potential impacts have not changed with the revised Project. These fuels are associated mainly with the construction vehicles and also with the turbines themselves. Spills could result from equipment malfunction, vehicle accidents, human error, terrorism, sabotage, vandalism, or aircraft impact.

2.10.2.1.3 Transportation

Anticipated potential impacts to public safety with respect to transportation are as described in Section 2.10.2.1.3 of the DEIS, which indicates that risk to the public from transportation is mainly from potential for accidents as equipment and materials are transported to the Project site. Specific potential transportation impacts associated with the Project changes since the DEIS (i.e. transportation of larger components) is addressed in Section 2.8.

2.10.2.1.4 Blasting

As described in Appendix A (Preliminary Blasting Plan) of this SEIS2, blasting of near surface exposed rock and rock removal may be required for construction of the Project when bedrock is encountered at depths less than 10 feet below ground surface in those instances when the bedrock is not rippable with an excavator or cannot be broken by pneumatic hammer. Although not anticipated, in the event that blasting is necessary, the procedure shall consist of implementing line control to full depth and then the use of controlled blasting techniques in one or more benches to create minimum breakage outside the line control but create maximum rock fragmentation within the target area. Potential health and safety concerns associated with blasting during construction include noise, vibrations, and the potential for flying debris. Any blasting work conducted for the Project would be conducted in accordance with an approved Blasting Plan, as described below in Section 2.10.3.1.4.

2.10.2.2 <u>Operation</u>

Anticipated potential impacts to public safety resulting from Project operation are as described in Section 2.10.2.2 of the DEIS.

2.10.2.2.1 Ice Shedding

Anticipated potential impacts to public safety resulting from ice shedding from Project turbines are as described in Section 2.10.2.2.1 of the DEIS. Since release of the DEIS, additional information has been published that indicates impacts related to ice shedding are unlikely because any ice shedding that could occur is likely to fall within established setbacks. The turbines proposed for the Project are equipped with features that pause operation when icing occurs.

The European Union Wind Energy in Cold Climates research collaborative has studied ice throw at operational wind farms throughout Europe. The data gathered show that ice fragments typically land within 410 feet (125 meters) of the wind turbine (Seifert et al., 2003). Ice throw observations are also available from a wind turbine near Kincardine, Ontario, where the operator conducted approximately 1,000 inspections between December 1995 and March 2001. Thirteen of these inspections noted ice build-up on the turbine. No ice pieces were found on the ground further than 328 feet from the base of the turbine, with most found within 164 feet (Garrad Hassan, 2007). Studies conducted in the Swiss Alps found that the maximum throwing distance was 302 feet. Almost fifty percent of the ice fragments weighed 0.1 pounds or less and the heaviest ice fragment weighed nearly four pounds (Cattin et al., 2008).

The facilities' current setback distances from permanent residences and adjacent property lines are in compliance with local laws and will adequately protect the public from falling ice. Local laws in Arkwright require a setback of 1,200 feet from non-participating residences, one and a half times the total height of the wind turbine from any non-wind turbine structure, as well as 500 feet from public roads. As currently sited, the setback distances for all turbines comply with these local laws. Because of the turbine setback distances to structures and public roads, risk from ice throw is considered minimal in the Project site. There are four instances were turbines have been sited within 1,200 feet of public recreational trails. Turbines 15 and 16 are located within approximately 530 feet and approximately 870 feet of existing established snowmobile trails respectively. Turbine 93 is located within approximately 780 feet of an existing snowmobile trail and 975 feet of a County hiking trail. While these setbacks exceed the distance of any previously documented ice throw, the Applicant will inform local snowmobile clubs of the potential risk of ice throw and will support the efforts of the snowmobile club to relocate the trails if required. Ice shedding in the proposed Project site presents more of a concern with respect to snowmobile traffic that may depart from authorized trails and access turbine bases. The Applicant will provide Project contact information to the local snowmobile clubs and at the request of local snowmobile clubs will meet to explain the risks of ice shedding and proper safety precautions.

Most recent data collected by the Global Wind Energy Council indicate that worldwide there were more than 225,000 turbines in operation by the end of 2012, and more have been constructed since. It is important to note that even with all of these turbines in operation, there has been no reported injury caused by ice being thrown from a turbine. However, occasional ice shedding does occur, and remains a potential safety concern.

The facilities current setback distances from permanent residences and adjacent property lines will adequately protect the public from falling ice. As currently sited, the distance between the proposed Project turbines and the nearest participating and non-participating residence is greater than 1,000 feet (304 meters) for all proposed turbine locations.

2.10.2.2.2 Tower Collapse/Blade Failure

It is unlikely that a tower collapse or blade failure incident should occur at the Arkwright Summit Wind Project as this is a rare and unexpected occurrence with wind turbine infrastructure. However, health and safety is a top priority for the Applicant and in the event of an incident, as with any health and safety risk identified at an EDPR project, the Applicant would take measures to identify the root cause of the issue and work with the service provider to mitigate any risk. The Vestas V110-2.2 MW wind turbine currently proposed for the Project will automatically shut down at wind speeds over 45 mph, which significantly reduces the chance of tower collapse and blade failure due to storms or other high wind events. Mitigation measures for tower collapse and blade failure are further described in Section 2.10.3.2.2 below and section 2.10.3.2.2 of the DEIS. Otherwise, the anticipated potential impacts to public safety resulting from tower collapse/blade failure are as described in Section 2.10.2.2.2 of the DEIS.

In addition, as described above, and in greater detail in Section 2.11 of this SEIS2, there are four instances where Project turbines have been sited within 1,200 feet of County recreational and/or snowmobile trails (see Figure 19 of this SEIS2). It is not anticipated that this will represent a safety issue or present any hazard to members of the public. The distance between the trails and the turbine locations range from approximately 530 feet to 1070 feet, all of which are significantly larger than the height of the turbines themselves. Consequently, no safety hazard is anticipated for recreational users of these trail systems.

2.10.2.2.3 Stray Voltage and Electrical Shock

Anticipated potential impacts to public safety resulting from stray voltage and electrical shock are as described in Section 2.10.2.2.3 of the DEIS, which indicates that there is potential for stray voltage associated with wind farms when the system is poorly grounded and in close proximity to underground or poorly grounded metal objects such as fences, pipelines, and buildings. These potential impacts have not changed with the revised Project. Although small electrical shocks from low levels of stray voltage are possible, conditions allowing for larger shocks significant enough to harm human health would trip the circuit breaker and shut down operation.

2.10.2.2.4 Fire

Anticipated potential impacts to public safety resulting from fire are as described in Section 2.10.2.2.4 of the DEIS, which indicates that fires in the tower or nacelle are possible but would likely not last for very long since the quantities of flammable materials are limited. These potential impacts have not changed with the revised Project. Although local fire departments are not equipped to respond to fires within the turbines due to their height, it is anticipated that they would be able to respond to ground fires in accordance with their hazardous materials and electrical fire training.

2.10.2.2.5 Lightning Strikes

Anticipated potential impacts to public safety resulting from lightning strikes are as described in Section 2.10.2.2.5 of the DEIS, which indicates that although lightning can strike a wind turbine nacelle or tower, there is no evidence that presence of turbines increases risk to humans from lightning strikes. Turbine performance analysts have confirmed that an increase in turbine height from about 410 feet proposed in the DEIS to 492 feet for the revised Project poses no increased risk of lightning strikes.

2.10.2.2.6 Electromagnetic Fields

Anticipated potential impacts to public safety resulting from electromagnetic fields are as described in Section 2.10.2.2.6 of the DEIS, which indicates that electromagnetic currents will be relatively low. These potential impacts have not changed with the revised Project. The electrical collection system will operate at 34.5 kV in all places and 115 kV near the point of interconnection with the 115 kV transmission lines. There are no significant impacts from EMF are expected as a result of the Project.

2.10.2.2.7 Vibration

Anticipated potential impacts to public safety resulting from vibration are as described in Section 2.10.2.2.7 of the DEIS, which indicates that turbine vibration will be minimal. These potential impacts have not changed with the revised Project. If vibration does occur, sensors will recognize it and cease turbine operation. Design standards take into account potential vibration from seismic activity, and adherence to the standards would prevent turbine collapse in the event of vibration from mechanical problems.

2.10.2.2.8 Health Effects

Anticipated potential public health effects resulting from project operation are as described in Section 2.10.2.2.8 of the DEIS. In addition, since the release of the DEIS, additional information has been published that indicates impacts related to health effects, specifically low frequency noise, are not anticipated.

Early wind turbines (designed with the blades downwind of the support tower) were prone to producing a periodic thumping noise each time a blade passed the tower, and the widespread belief that wind turbines generate excessive or even harmful amounts of low frequency noise likely originated with this phenomena. While modern wind turbines have been re-configured with blades arranged upwind of the tower, and therefore no longer produce the same magnitude of thumping noises, the myth of excessive low-frequency noise may have perpetuated due to confusion of low frequency sound with the amplitude modulation typical of wind turbines (i.e., the periodic swishing sound with a frequency of about 1 Hz). However, numerous studies show that the low frequency content in the sound spectrum of a typical modern wind turbine – like those proposed for this Project – is no higher than that of the natural background sound level in rural areas (Sondergaard & Hoffmeyer, 2007; Hessler et al., 2008).

In addition, in response to concerns that sounds emitted from wind turbines cause adverse health consequences, The America Wind Energy Association and The Canadian Wind Energy Association established a scientific advisory panel to conduct a review of current literature pertaining to the perceived health effects of wind turbines (Colby et al., 2009). The multidisciplinary panel was comprised of medical doctors, audiologists, and acoustical professionals from the United States, Canada, Denmark, and the United Kingdom. The objective of the panel was to provide an authoritative reference document for legislators, regulators, and anyone who wants to make sense of the conflicting information pertaining to wind turbine sound. The panel evaluated peer-reviewed literature on sound and health effects, as well as sound produced by wind turbines. The panel concluded that there is no evidence that the audible or sub-audible sounds produced by operating wind turbines have any direct adverse physiological effects and the ground-borne vibrations from wind turbines are too weak to be detected by, or to affect, humans. In addition, based on the levels and frequencies of the sounds produced by operating wind turbines and the panel's experience with sound exposures in occupational settings, the sounds produced from operating wind turbines are not unique and therefore do not likely cause direct adverse health consequences (Colby et al., 2009).

The Chief Medical Officer of Health (CMOH) of Ontario also reviewed existing scientific evidence on the potential health impact of noise generated by wind turbines. The report concluded, "…the scientific evidence available to date does not demonstrate a direct causal link between wind turbine noise and adverse health effects. The sound level from wind turbines at common residential setbacks is not sufficient to cause hearing impairment or other direct health effects, although some people may find it annoying" (CMOH of Ontario, 2010).

In addition, the Massachusetts Department of Environmental Protection (MassDEP) and Massachusetts Department of Public Health (MDPH) assembled a team of independent experts to identify any documented or potential health impacts or risks that may be associated with exposure to wind turbines and discuss public health effects relating to wind turbines, based on scientific findings. To do this, the independent, expert panel conducted a literature review, including peer-reviewed scientific studies, other reports, and popular media, as well as reviewed public comments received by the MassDEP and/or MDPH. According to the report, there is insufficient evidence that the noise from wind turbines is directly causing health problems or disease (Ellenbogen et al., 2012).

2.10.3 Proposed Mitigation

2.10.3.1 <u>Construction</u>

Proposed mitigation measures pertaining to project construction are as described in Section 2.10.3 of the DEIS.

2.10.3.1.1 Fire or Explosion

Proposed mitigation measures for fire or explosions relating to Project construction are as described in Section 2.10.3.1.1 of the DEIS. The Project layout presented in this SEIS2 of 36 turbines adheres to the 500-foot setback from gas well infrastructure. The applicant continues to discuss location of underground wells and appropriate setback and safety measures with gas well owners and operators.

2.10.3.1.2 Release or Potential Release of Hazardous Materials

Proposed mitigation measures pertaining to the release or potential release of hazardous materials are as discussed in Section 2.10.3.1.2 of the DEIS.

2.10.3.1.3 Transportation

Proposed mitigation measures pertaining to transportation are as discussed in Section 2.10.3.1.3 of the DEIS. A construction routing plan will be developed to assure that construction vehicles avoid areas where public safety could be a concern, such as schools and densely populated areas.

2.10.3.1.4 Blasting

A Preliminary Blasting Plan is included as Appendix A of this SEIS2. If it is determined that blasting is necessary, then a Final Blasting Plan shall be submitted to (and approved by) the Town, in writing. Blasting shall be performed only after approval has been given by the construction manager for such operations and must comply with the following provisions, as well as other conditions established by the appropriate regulatory agencies.

H. The contractor or its subcontractor shall use sufficient stemming, matting or natural protective cover to prevent fly rock from leaving property owned or under control of the Applicant or operator or from entering protected natural resources or natural buffer strips. Crushed rock or other suitable material must be used for stemming when available. Native gravel, drill cuttings or other material may be used for stemming if no other suitable material is available.

I. The maximum allowable air-blast at any inhabited building not owned or controlled by the developer may not exceed 128 decibels peak when measured by an instrument having a flat response (+ or - 3 decibels) over the range of 5 to 200 hertz.

J. The maximum allowable air-blast at an uninhabited building not owned or controlled by the developer may not exceed 128 decibels peak when measured by an instrument having a flat response (+ or - 3 decibels) over the range of 5 to 200 hertz. Depending on building use (or lack thereof), the allowable air-blast may increase to 140 decibels peak.

K. If a blast is to be initiated by detonating cord, the detonating cord must be covered by crushed rock or other suitable cover to reduce noise and concussion effects.

L. Prior to blasting at each site, a pre-blast survey will be conducted. The pre-blast survey will inspect the blast area, and adjacent areas. The survey will document existing conditions and will include, but not be limited to buildings/structures, water supply wells, utilities (above and below ground). The survey will include written documentation as well as photographic documentation of existing conditions.

M. Blasting may not occur in the period between sundown and sunrise of the following day or in the period from 7:00 p.m. to 7:00 a.m., whichever is greater.

N. A record of each blast, including seismographic data, must be kept for at least one year from the date of the last blast by the general contractor, its subcontractor (if appropriate) and the Applicant, and must be available for inspection during normal business hours. The blast record shall contain, at a minimum, the following data:

- Name of blasting company or blasting contractor;
- Location, date and time of blast;
- Name and signature of blaster;
- Type of material blasted;
- Number and spacing of holes and depth of burden or stemming;

- Diameter and depth of holes;
- Type of explosives used;
- Total amount of explosives used;
- Maximum amount of explosives used per delay period of 8 milliseconds or greater;
- Maximum number of holes per delay period of 8 milliseconds or greater;
- Method of firing and type of circuit;
- Direction and distance in feet to the nearest structure (both owned and not owned) by the project developer;
- Weather conditions, including such factors as wind direction and cloud cover;
- Height or length of stemming;
- Amount of mats or other protection used;
- Type of detonators used and delay periods used;
- The exact location of each geophone and the distance of each geophone from the blast;
- Seismographic readings, including peak particle velocity and frequency measured in the horizontal, vertical and longitudinal directions, and air-blast data;
- Name and signature of the person operating each seismograph;
- Names of the person and the firm analyzing the seismographic data, and
- The stratum or structure on which the geophone is located during each blast.

At the completion of basting, a post-blast survey will be conducted of the same facilities (structures, foundations, water supply wells, utilities, etc.) as documented during the pre-blast survey. Findings inconsistent with those reported during the pre-blast survey will immediately be provided to the contractor/subcontractor/Applicant, and will be documented in writing and photographs. Depending on the nature (and source) of the inconsistency, specific corrective actions will be developed in consultation with the affected party, and will set forth the method, procedures, and timing of implementation.

2.10.3.2 Operation

2.10.3.2.1 Ice Shedding

Proposed mitigation measures pertaining to ice shedding are as described in Section 2.10.3.2.1 of the DEIS. These proposed mitigation measures have not changed with the revised Project. The revised SEIS2 turbine layout adheres to the safety setbacks for roads and residences as described in the DEIS and Section 2.10.2.2.1 of this SEIS2. In addition to measures described in the DEIS, the Applicant will provide Project contact information to local snowmobile clubs and if requested, will meet with local snowmobile clubs to explain the risk of ice shedding and proper safety precautions.

2.10.3.2.2 Tower Collapse/Blade Failure

Proposed mitigation measures pertaining to tower collapse/blade failure are as described in Section 2.10.3.2.2 of the DEIS. These proposed mitigation measures have not changed with the revised Project. These measures include technological safeguards, such as brakes, pitch controls, and sensors that shut down turbines when equipment malfunctions. Siting turbines with adequate setbacks from residences and public roads is another important mitigation measure that ensures safety in the event of a tower collapse or blade failure. As noted in Section 2.10.2.2.2 above, although tower collapse and blade failure instances are a rare and unexpected occurrence, in any incident the root cause would be identified and the risk would be mitigated as needed in coordination with internal and external stakeholders including the turbine service provider.

2.10.3.2.3 Stray Voltage and Electrical Shock

Proposed mitigation measures pertaining to stray voltage and electrical shock are as described in Section 2.10.3.2.3 of the DEIS. These include proper grounding, installation, and maintenance practices that eliminate or reduce stray voltage at the Project site. If a resident suspects stray voltage at their agricultural operation, the Applicant will conduct tests to quantify the existing voltage potential before the Project starts and then again during operation to determine whether the Project has added additional stray voltage to the site.

2.10.3.2.4 Fire

Proposed mitigation measures pertaining to fire are as described in section 2.10.3.2.4 of the DEIS. These proposed mitigation measures have not changed with the revised Project. These measures include built-in safety features of the turbines that minimize fire risk by sensing and reporting equipment malfunctions to the Project control center. In the event of a fire, power to the turbines would be cut off. The transformers at the substation will be equipped with fire suppression systems as well. Additionally, maintenance personnel will adhere to a Fire Protection and Emergency Response Plan that includes a fire prevention program that mandates regular inspections of turbine components, properly maintaining fire-fighting equipment, and coordination with local fire departments for ongoing fire safety awareness.

2.10.3.2.5 Lightning Strikes

Proposed mitigation measures pertaining to lighting strikes are as described in Section 2.10.3.2.5 of the DEIS.

2.10.3.2.6 Electromagnetic Fields

Proposed mitigation measures pertaining to electromagnetic fields are as described in Section 2.10.3.2.6 of the DEIS.

2.10.3.2.7 Vibration

Proposed mitigation measures pertaining to vibration are as described in Section 2.10.3.2.7 of the DEIS. Since no adverse impacts to public safety are anticipated due to vibration, mitigation is not required.

2.10.3.2.8 Health Effects

Proposed mitigation measures pertaining to health effects are as described in section 2.10.3.2.8. There are no anticipated adverse effects to public health resulting from the construction and operation of the Project.

2.11 COMMUNITY FACILITIES AND SERVICES

2.11.1 Existing Conditions

This chapter updates information on community facilities and services provided in Section 2.11 of the DEIS and SEIS. Although the SEIS2 Project layout features fewer turbines than the Project layouts presented in the DEIS and SEIS, impacts to community facilities and services are similar because the number of employees required, and the nature of the work proposed, have not changed substantially. During operation, the Project is expected to require approximately 5 full time employees (some of which will be drawn from the existing population, see Section 2.9 of this SEIS2 for anticipated impacts to the economy and employment). Therefore, significant population growth is not anticipated and demand for community facilities and services should not increase substantially.

2.11.1.1 Public Utilities and Private Energy Infrastructure

As indicated in Section 2.11.1.1 of the DEIS and Section 1.4 of this SEIS2, the purpose of the proposed Project is to create a wind-powered energy facility that will provide a significant source of renewable energy to the New York power grid. The Project responds to objectives identified in the Renewable Energy Task Force's 2008 Report, the 2009 New York State Energy Plan (New York State Energy Planning Board [NYSEPB], 2009), the 2014 Draft New York State Energy Plan (NYSEPB, 2014), and the Renewable Portfolio Standard (RPS) for New York State (NYSERDA, 2015). In September 2004, the Public Service Commission (PSC) approved the RPS and identified a renewable energy policy, which calls for an increase in renewable energy used in the State to 25% by the year 2013 (PSC, 2004). In 2008, the PSC increased the goal to 30% by 2015 (NYSERDA, 2008).

The New York State Energy Plan contains a series of mandatory policy objectives that the Project will assist in achieving. Among these objectives is to increase the use of energy systems that enable the State to significantly reduce greenhouse gas emissions while stabilizing long-term energy costs, the key objective being to increase the percentage of non-fossil fuel consuming ('renewable') sources of generation, and improving the State's energy independence through development of in-state energy supply resources. The State Energy Plan recognizes that wind energy projects will play a role in fulfilling this objective.

2.11.1.2 Police Protection

Police protection is as described in Section 2.11.1.2 of the DEIS.

2.11.1.3 Fire Protection and Emergency Response

Fire protection and emergency services are as described in Section 2.11.1.3 of the DEIS.

2.11.1.4 Health Care Facilities

Health care facilities are as described in section 2.11.1.4 of the DEIS.

2.11.1.5 Educational Facilities

Educational facilities are as described in section 2.11.1.5 of the DEIS.

2.11.1.6 Parks and Recreation

Parks and recreation resources in the vicinity of the Project are generally as described in section 2.11.1.6 of the DEIS. As stated in the DEIS, the Earl Cardot Eastside Overland Trail runs through the eastern portion of Chautauqua County adjacent to the Project Site (see Figure 19). The trail is a part of the Chautauqua County trail system, and use of motor vehicles on the trail is prohibited. The trail runs within approximately 975 feet of turbine 93 in the SEIS2 Project layout. A network of snowmobile trails also runs through the southeastern portion of the Project Site and vicinity. Snowmobile trails in Chautauqua County are maintained by local clubs, and are generally funded by member dues and a grant from the NYS DEC. A snowmobile trail runs within approximately 780 feet of turbine 93, and a second trail runs within approximately 530 feet of turbine 15, and 870 feet of turbine 16 (see Figure 19).

2.11.2 Anticipated Impacts

2.11.2.1 <u>Construction</u>

2.11.2.1.1 Public Utilities and Private Energy Infrastructure

Anticipated potential impacts to public utilities and private energy infrastructure resulting from Project construction are as described in Section 2.11.2.1.1 of the DEIS.

2.11.2.1.2 Police Protection

Anticipated potential impacts to the demand for existing police protection resulting from Project construction are as described in Section 2.11.2.1.2 of the DEIS. The Project will not have significant adverse impacts on the demand for existing police protection during the construction period.

2.11.2.1.3 Fire Protection and Emergency Response

Anticipated potential impacts to the demand for fire protection and emergency response resulting from Project construction are as described in Section 2.11.2.1.3 of the DEIS. The Project will not have significant adverse impacts on the demand for existing fire protection and emergency response during the construction period.

2.11.2.1.4 Health Care Facilities

Anticipated potential impacts to the demand for health care facilities resulting from Project construction are as described in Section 2.11.2.1.4 of the DEIS. The Project will not have significant adverse impacts on health care facilities during the construction period.

2.11.2.1.5 Educational Facilities

Anticipated potential impacts to educational facilities resulting from Project construction are as described in Section 2.11.2.1.5 of the DEIS. The Project will not have significant adverse impacts on educational facilities during the construction period.

2.11.2.1.6 Parks and Recreation

Anticipated potential impacts local parks and recreation resulting from Project construction are as described in Section 2.11.2.1.6 of the DEIS.

2.11.2.2 <u>Operation</u>

2.11.2.2.1 Public Utilities and Private Energy Infrastructure

Anticipated potential impacts to public utilities and private energy infrastructure resulting from Project operation are as described in Section 2.11.2.2.1 of the DEIS.

2.11.2.2.2 Police Protection

Anticipated potential impacts on the demand for police protection resulting from Project operation are as described in Section 2.11.2.2.2 of the DEIS. The Project will not have significant adverse impacts on the demand for police protection during operation.

2.11.2.2.3 Fire Protection and Emergency Response

Anticipated potential impacts on the demand for fire protection and emergency response resulting from Project operation are as described in Section 2.11.2.2.3 of the DEIS.

2.11.2.2.4 Health Care Facilities

Anticipated potential impacts on the demand for health care facilities resulting from Project operation are as described in Section 2.11.2.2.4 of the DEIS.

2.11.2.2.5 Educational Facilities

Anticipated potential impacts to educational facilities resulting from Project operation are as described in Section 2.11.2.2.5 of the DEIS.

2.11.2.2.6 Parks and Recreation

With the exception of potential impacts to recreational trails, anticipated potential impacts to parks and recreation resulting from Project operation are as described in Section 2.11.2.2.6 of the DEIS. As described in Section 2.11.1.6 of this SEIS2, the Earl Cardot Eastside Overland Trail runs within 1,000 feet of the proposed location of turbine 93 of the current Project layout. In addition, two snowmobile trails run within 1,200 of three proposed wind turbines. The Town of Arkwright Local Law 2 of 2007, §662 requires a setback of 1,200 or 200 percent of the total tower height, whichever is greater, from the boundaries of the County's existing or proposed trails, trail facilities, and recreation areas. However, no interference with recreational use of these trails or potential hazard to the public are anticipated as a result of the proximity of the Project. The Applicant is seeking a variance pursuant to the Town's zoning law to resolve this non-compliance with the required setback.

In a letter to the Applicant dated July 1, 2009 from the Chautauqua County Parks Manager (Appendix C of this SEIS2), the Chautauqua County Parks Department acknowledges that one of the proposed turbine locations (turbine 14, which, at the time was part of the SEIS layout) is within the 1,200 foot setback defined in the Town of Arkwright Local Law 2 of 2007. The letter goes on to state that the department: "Hereby supports a waiver of the setback in accordance with Article VI-A, §663. This letter is submitted to show no objection for Arkwright Summit Wind Farm LLC to submit their application for a Wind Energy Permit inclusive of turbine 14." EDR followed up with Chautauqua County Department of Planning & Economic Development personnel in July of 2015 regarding locating proposed wind turbines within 1,200 feet of County trails. Chautauqua County Department of Planning & Economic Development staff confirmed the County's previous position by stating that they did not feel siting turbines within 1,200 feet of the trails was a significant issue.

Despite the fact that there are four instances where Project turbines have been sited within the 1,200 foot setback for County trails described above, it is not anticipated that this will represent a safety issue or present any hazard to members of the public. As stated above, the distance between the trails and the turbine locations range from 530 feet to 1070 feet, all of which are significantly larger than the height of the turbines themselves. Consequently, no safety hazard is anticipated for recreational users of these trail systems.

2.11.3 Proposed Mitigation

2.11.3.1 Construction

2.11.3.1.1 Public Utilities and Private Energy Infrastructure

Mitigation measures for potential impacts to public utilities and private energy infrastructure are as described in Section 2.11.3.1.1 of the DEIS, except that, with the reduction of turbines from 44 from the SEIS to 36 for the current SEIS2, the Project will provide 78.6 MW of new generation capacity to the New York State grid.

2.11.3.1.2 Police Protection

Mitigation measures for potential impacts to police protection are as described in Section 2.11.3.1.2 of the DEIS. Project construction will not have a significant adverse impact on the demand for police protection. Consequently, no mitigation measures are needed.

2.11.3.1.3 Fire Protection and Emergency Response

Mitigation measures for potential impacts to fire protection and emergency response services are as described in Section 2.11.3.1.3 of the DEIS.

2.11.3.1.4 Health Care Facilities

Mitigation measures for potential impacts to health care facilities are as described in Section 2.11.3.1.4 of the DEIS. Project construction will not have a significant adverse impact on health facilities. Therefore, no mitigation measures are needed.

2.11.3.1.5 Educational Facilities

Mitigation measures for potential impacts to educational facilities are as described in Section 2.11.3.1.5 of the DEIS.

2.11.3.1.6 Parks and Recreation

Construction impacts are expected to be minor and short-term for the duration of the construction period, which will mainly occur outside of the winter snow season. Mitigation measures for potential impacts to parks and recreation are as described in Section 2.11.3.1.1 of the DEIS.

2.11.3.2 Operation

2.11.3.2.1 Public Utilities and Private Energy Infrastructure

Mitigation measures for potential impacts to public utilities and private energy infrastructure resulting from Project operation are as described in Section 2.11.3.2.1 of the DEIS. Project operation will not have a significant adverse impact on public utilities and private energy infrastructure. Consequently, no mitigation measures are necessary.

2.11.3.2.2 Police Protection

Mitigation measures for potential impacts to the demand for police protection resulting from Project operation are as described in Section 2.11.3.2.2 of the DEIS. Project operation will not have a significant adverse impact on the demand for police protection. Therefore, no mitigation measures are necessary.

2.11.3.2.3 Fire Protection and Emergency Response

Mitigation measures for potential impacts to the demand for fire protection and emergency response services resulting from Project operation are as described in Section 2.11.3.2.3 of the DEIS.

2.11.3.2.4 Health Care Facilities

Mitigation measures for potential impacts health care facilities resulting from Project operation are as described in Section 2.11.3.2.4 of the DEIS. Project operation will not have a significant adverse impact on healthcare facilities. Consequently, no mitigation measures are necessary.

2.11.3.2.5 Educational Facilities

Mitigation measures for potential impacts to educational facilities resulting from Project operation are as described in Section 2.11.3.2.5 of the DEIS. Project operation will not have a significant adverse impact on educational facilities. Therefore, no mitigation measures are necessary.

2.11.3.2.6 Parks and Recreation

The Town of Arkwright Local Law 2 of 2007, §662 requires a setback of 1,200 or 200 percent of the total tower height, whichever is greater, from the boundaries of the County's existing or proposed trails, trail facilities, and recreation areas. As described in Section 2.11.1.6 and 2.11.2.6 of this SEIS2, there are three trails located within 1,200 of three of the proposed wind turbines (see Figure 19). As described in Section 2.11.2.2.6, the County does not object to the location of the turbines relative to the trails and no significant risks to the public are anticipated. The Applicant is seeking a variance pursuant to the Town's zoning law to resolve this non-compliance with the required setback.

In addition, snowmobiling in the area will not be restricted during Project operation. Arkwright Summit has been in consultation with local snowmobile groups such as the Cherry Creek Snow Goers to educate snowmobilers about safety measures for wind turbines. The Cherry Creek Snowmobile Trail crosses the access road between turbine 15 and turbine 93 in two locations (see Figure 19). This access road will not be fenced or blocked in any manner that would prevent recreational use to the trail system. Therefore, potential impacts to recreational users enjoyment of the snowmobile trail have been avoided.

2.12 COMMUNICATION FACILITIES

Comsearch was contracted to update previously prepared studies (included in the DEIS and SEIS) to address the potential effect of the SEIS2 Project layout on communication facilities. These included a communication tower survey (Comsearch, 2015a), Microwave Path Analysis (Comsearch, 2015b), Off-Air Television Analysis (Comsearch, 2015b) and an AM/FM radio report (Comsearch, 2015d). In addition, the Applicant consulted with the National Telecommunications and Information Administration (NTIA). Each of these studies are summarized below.

2.12.1 Existing Conditions

2.12.1.1 <u>NTIA Consultation</u>

In January, 2015, the Applicant contacted the NTIA of the U.S Commerce Department to request a review by the Inter-department Radio Advisory Committee (IRAC; see Appendix C). The IRAC includes the Department of Defense (DOD), Department of Education (DOE), Department of Justice (DOJ), and the Federal Aviation Administration (FAA). The purpose of this consultation was to determine if any IRAC entities have concerns regarding the SEIS2 Project layout.

2.12.1.2 Communication Tower Study

A communication tower study (Comsearch, 2015a) was performed to identify all communication signal towers, and their owners within the vicinity of the SEIS2 Project. The locations and information pertaining to communication towers within the Project area were derived from a variety of sources including the FCC's Antenna Structure Registration (ASR) database, Universal Licensing System (ULS), national and regional tower owner databases, and the local planning and zoning boards.

Seven communication tower structures and 29 active communication antennas were identified in the vicinity of the Project site using the methodology provided above (see Appendix Q of this SEIS2). The communication antennas are located on a variety of structure types such as guyed towers, monopoles, silos, or rooftops.

2.12.1.3 Microwave Analysis

Microwave communication systems include cellular telephone and data networks. The updated microwave path analysis (Comsearch, 2015b) identified 12 licensed microwave paths that intersected the SEIS2 Project Layout. The location of each microwave path is depicted in the Comsearch report and in Figure 20 of this SEIS2. The report also provides additional information for each path such as the call sign, band, path length, and licensee (see Appendix Q of this SEIS2 for additional information).

2.12.1.4 Television Analysis

The television reception analysis conducted by Comsearch identified all off-air television stations within a 150-kilometer radius of the proposed Project, as measured from the approximate center of the SEIS2 Project vicinity as identified in the report. Off-air television stations transmit broadcast signals from terrestrially located facilities that can be received directly by a television receiver or house-mounted antenna (Comsearch, 2015c). The results of the study indicate that there are 72 off-air television stations (57 in the United States and 15 in Canada) within 150 kilometers of the Project area of interest (see Off-Air TV Analysis in Appendix Q of this SEIS2). The stations most likely to provide off-air coverage to the Project area are those within a distance of 75 kilometers or less. Comsearch identified 45 stations within 75 kilometers of the Project area, of which 23 are currently licensed and operational stations. Seven of these operational stations are translators (low power) stations with limited range. One of the licensed full-power stations, WNYB is located within the vicinity of the SEIS2 Project Layout. This station is licensed to the Faith Broadcasting Network, Inc. of Marion, Illinois.

2.12.1.5 AM/FM Station

Comsearch performed an analysis to identify AM and FM broadcast stations within 30 kilometers of the Project Site on July 10, 2015 (Comsearch, 2015d; Appendix Q of this SEIS 2). The results show that there are two AM stations 8.7 kilometers from the nearest turbine (Table 1 and Figure 1 in Appendix Q). Comsearch also determined that there are 15 FM stations within 30 kilometers of the center of the Project Site, however only 12 of these stations are currently licensed and operating. (Table 2 and Figure 2 in Appendix Q). None of the FM stations are a full-power station (greater than 10 kilowatts [kW]). Four of the stations are medium-power FM stations (between 1 and 10 kW). Five of the stations are low-power stations (between 100 Watts (W) and 1 kW). Six of the stations are very low-power stations (less than 100 W).

The maximum possible exclusion distance for AM broadcast stations is three kilometers, based on directional broadcasting at 1000 KHz or less. Potential problems are anticipated to occur when stations are within this distance. Since the nearest AM station is over 8 kilometers from the nearest turbine, no impact is anticipated. When wind turbines are cited in the far field region of FM signals coverage is generally not affected. The nearest operating station (W203AW) is located 4.1 kilometers from the nearest turbine. At this distance interference caused by wind turbines is not expected, as this distance provides adequate separation to avoid radiation pattern distortion.

2.12.2 Anticipated Impacts

2.12.2.1 Construction

Potential impacts to communication facilities as a result of Project construction are as identified in Section 2.12.2.1 of the DEIS, and are not anticipated to be significant. Construction of the SEIS2 Project layout will not have any additional or different impacts on communication facilities than those described in the DEIS. Cranes used during construction activities can cause temporary degradation to television and radio signals. However, these impacts would be of short duration, since the cranes are only used at any given site for turbine assembly and erection, which is typically completed in one to two days per turbine.

2.12.2.2 Operation

Potential impacts to communication facilities (including microwave communication systems, off-air television systems, AM/FM Broadcast, Military Radar, and other forms of communication) as a result of Project operation are generally as indicated in Section 2.12.2.2 of the DEIS, except as noted below.

2.12.2.2.1 NTIA Consultation

The NTIA provided a response on April 1, 2015, which indicated that no IRAC agencies identified any issues with the proposed locations of turbines in the SEIS2 Project layout (NTIA's response is included in Appendix C).

2.12.2.2.2 Communication Towers

According to Comsearch (2015c), impacts to communication tower function are best avoided by not siting turbines in close proximity to existing communication towers. The physical turning radius, height of the wind turbine and the characteristics of the communication systems on the communication tower are the major factors in determining a reasonable distance between a wind turbine and a communication tower. A setback distance greater than the maximum height of the wind turbine is necessary to prevent damage to communication towers in the unlikely event of a turbine tower failure. All of the proposed wind turbines are located greater than 492 feet from the nearest communication tower. Therefore, no direct impacts to communication towers in the unlikely event of tower failure are anticipated.

The separation distance necessary to prevent impacts to the function of a communication tower will vary depending on the type(s) of communication antennas located on the tower. For example, AM, FM and TV communication antennas should be separated by distances that allow for normal coverage. For FM and TV stations, the separation distances can be as great as 4 kilometers (2.49 miles, or 13,123 feet) and for AM stations 3.2 kilometers (1.99 miles, or 10,499 feet). For land mobile and mobile phone systems, setback distances are based on FCC interference emissions from electrical devices in the land mobile and mobile telephone frequency bands. Table 33 shows the communication structures within the Project area identified by Comsearch and the distance of each structure to the nearest wind turbine.

Table 33. Turbines Nearest to Communication Towers within the Project Area

Tower ID	Type	Service Types	Nearest Turbine	Distance (ft)
1	Communication Tower	TV, Microwave, Land Mobile	66	851.7
2	Communication Tower	Microwave, Land Mobile	66	1408.4
3	Communication Tower	Land Mobile, Microwave	30	1993.1
4	Communication Tower	Unknown, SBA Communications	115	2030.3
5	Communication Tower	Microwave, Cellular, Paging	115	1685.6
6	Communication Tower	Microwave	115	1656.2
7	Communication Tower	Unknown, KGI Wireless	50	2335.7
8	Antenna	Microwave	103	994.0

9	Antenna	FM	110	4826.6
10	Antenna	Land Mobile	28	1293.8
11	Antenna	Land Mobile	33	2234.1

2.12.2.2.3 Microwave Communication Systems

To assure an uninterrupted line of communications, a microwave link should be clear, not only along the axis between the center point of each antenna, but also by a mathematical distance around the center axis known as the Fresnel Zone. A Fresnel Zone was calculated for each of the 12 microwave paths that intersect the Project site (Comsearch, 2015b). The digital path files were incorporated into GIS and analyzed along with the current turbine layout as depicted in Figure 20 From this analysis, it was determined that the preliminary preferred location of one of the Project turbines (turbine 27) was located within one of the microwave path Fresnel Zones. As a consequence, the turbine was re-sited approximately 25 feet to the north so as to avoid impacts to this microwave path. The SEIS2 Project layout has been intentionally sited to avoid impacts to microwave paths.

2.12.2.2.4 Television Communication Systems

As described in Section 2.12.1.2, Comsearch (2015c) determined that the stations most likely to produce off-air coverage to the Project area are those within a distance of 75 kilometers or less. Comsearch identified one station (WNYB) within the vicinity of the SEIS2 Project, and indicated that reception of this station may be severely disrupted depending on the final turbine locations. Furthermore, 13 of the other licensed full-power stations, WBBZ-TV, WKBW-TV, WIVB-TV, WGRZ, WUTV, WNLO, WNED-TV, WSEE-TV, WICU-TV, WNYO-TV, WQLN, WFXP, and WJET-TV, may have their reception disrupted in and around the Project. Communities and homes located south and west of the Project may have degraded reception of stations WBBZ-TV, WKBW-TV, WGRZ, WUTV, WNLO, WNED-TV, and WNYO-TV, which are located northeast of the Project site, after the wind turbines are installed. Similarly, stations WSEE-TV, WICU-TV, WQLN, WFXP, and WJET-TV, which broadcast from the southwest of the Project site may have diminished reception in communities directly to the north and east.

It is worth noting that surveys of TV reception in the U.S. found that only ten percent of households now rely solely on off-air television, while cable service and satellite are more likely the dominant modes of television service delivery. Specific impacts to TV reception would most likely include noise generation at low VHF channels within 0.5 mile of turbines, reduced picture quality (e.g., ghosting or shimmering), and signal interruption (NWCC, 2005).

2.12.2.2.5 AM/FM Stations

No potential impacts to AM or FM broadcast stations were identified for the SEIS2 Project layout (Comsearch, 2015d; see Appendix Q).

2.12.2.2.6 Military Radar

As described above in Section 2.112.2.2.1 of this SEIS2, NTIA consultation did not result in any concerns from IRAC agencies, including the DOD. Therefore, no impacts to military radar resulting from operation of the Project are anticipated.

2.12.3 Proposed Mitigation

2.12.3.1 Construction

As described in section 2.12.3.1 of the DEIS, Project construction is not expected to result in any significant impacts to communication facilities. Therefore, no mitigation is necessary or proposed.

2.12.3.2 Operation

2.12.3.2.1 NTIA Consultation

The NTIA did not identify any potential impacts from the proposed Project on federal radio frequencies. Therefore, no mitigation is proposed.

2.12.3.2.2 Communication Towers

As stated in Section 2.12.2.2.6 of this SEIS2, impacts to communication towers are best mitigated by siting turbines at a distance far enough away from a communication tower so as to not physically impact the tower or interfere with its function. As described herein, the SEIS2 Project layout has been intentionally sited to avoid impacts to communication towers. Therefore, potential impacts to communication towers have been minimized to the maximum extent practicable. However, in the unlikely event of interference with any communication services, the Applicant will mitigate those issues as described below.

2.12.3.2.3 Microwave Communication Systems

As described in Section 2.12.2.2.3 of this SEIS2, the SEIS2 Project layout has been intentionally sited to avoid impacts to microwave paths. Therefore, no interference with microwave communication paths are anticipated and no mitigation is proposed.

2.12.3.2.4 Television Communication Systems

Mitigation measures for potential impacts to television communication facilities resulting from Project operation remain as described in Section 2.12.3.2.2 of the DEIS, and are described below. In 2009, high-power television broadcast stations ceased analog operations and began broadcasting exclusively in digital format. However, low-power TV broadcasters and translators were exempt from the FCC's digital requirement, and some may still broadcast analog signals. Since the conversion to digital broadcast, there has been an improvement in television reception in the vicinity of wind energy facilities (Polisky, 2011). If Project operation results in any impacts to existing off-air television coverage, the Applicant will address and resolve each individual problem, as necessary. This will be accomplished through the Complaint Resolution Procedure outlined in Appendix O of this SEIS2. Mitigation actions could include adjusting existing receiving antennas, upgrading the antenna, or providing cable or satellite systems to the affected households. In addition, the Applicant can mitigate turbine-related contrast variation (shimmering) by outfitting households using analog televisions with digital converters to make use of digital broadcast signals.

2.12.3.2.5 AM/FM Stations

As described in Section 2.12.2.2.5 of this SEIS2, no impacts to AM or FM broadcast stations are anticipated. Therefore, no mitigation is proposed.

2.12.3.2.6 Military Radar

As described in Section 2.12.2.2.6 of this SEIS2, no impacts to military radar are anticipated. Therefore, no mitigation is proposed.

2.13 LAND USE AND ZONING

2.13.1 Existing Conditions

2.13.1.1 Regional and Local Land Use

Regional and local land use pertaining to the vicinity of the Project Site is as described in Section 2.13.1.1 of the DEIS. The reduction of the Project from 47 turbines in the DEIS to the current 36 turbine layout in this SEIS2 has reduced the area of land used by the Project from approximately 5,950 acres in the DEIS to approximately 3,883 acres for the current layout.

Land use in Chautauqua County is largely characterized by agricultural and rural residential areas. Major developed commercial and industrial areas in the County include the City of Dunkirk and the City of Jamestown. As discussed in Section 2.9 (Socioeconomics) of this SEIS2, agriculture contributes significantly to the County's economy. According to the United States Census of Agriculture, there were a total of 1,515 farms that encompassed 236,546 acres or 35.1% of the land in Chautauqua County. In 2012, the estimated average market value of land and buildings per farm was $322,390 in Chautauqua County and $525,587 in New York State (USDA Census of Agriculture, 2012). Despite agriculture accounting for a small percentage of employment in Chautauqua County, agriculture contributes heavily to the local economy. The County is ranked second in the state for the production of fruits, tree nuts, and berries, twelfth in the state for the production of cattle and calves, and thirteenth in the state for the production of diary. Chautauqua County is also a significant producer of wine grapes, and devotes more acres to their production than any other New York State County. In 2012, the market value of all agricultural goods sold was $161,849,000 for Chautauqua County, which ranks the County at eleventh in New York State.

2.13.1.2 Zoning and Other Applicable Laws

A discussion of the zoning laws adopted by the Towns of Arkwright and Pomfret is provided in Section 2.13.1.2 of the DEIS. As it relates to the Project, the Towns zoning laws remain as stated in the DEIS and there have been no amendments affecting the construction or operation of the Project. The Town of Arkwright Town Board has recently introduced an amendment to Section 659(13) of Article VI-A of the zoning ordinance which would increase the permissible height of any wind energy conversion system (WECS) to a maximum of 500 ft. The review of the amendment to the zoning ordinance is being conducted as part of the SEQRA review for the Project. The potential impacts related to the proposed change in height of the proposed turbines for the Project are described throughout this SEIS2 and is discussed in greater detail below (see Section 2.13.2.2.2 of this SEIS2).

As shown in Figure 21 of this SEIS2, all of the participating Project parcels in both towns are zoned as AR 1 (Agricultural – Residential). In the Town of Arkwright, wind facilities are allowed in the AR1 district and are considered permitted uses that require a special use permit (Town of Arkwright Local Law 2 of 2007, §656). As discussed in the DEIS, the Applicant has applied for a Special Use Permit from the Town of Arkwright and the creation of a Wind Overlay Zone (Town of Arkwright Local Law No. 2, 2007). In the Town of Pomfret, the Town has a Wind Energy Facilities Law, Section 647-A, et. seq. in the Town's Zoning Law. Under the Town's Wind law, unlike WECS, which require a special use permit and wind overlay, Section 647-K(15) of the Wind Energy Facilities Law states that the "substation required to serve WECS are an Essential Public Service under this Zoning Code". Section 404 states that utilities, such as the proposed substation and Generator Lead line, are permitted uses by right in the AR-1 district upon issuance of a zoning permit (Pomfret Zoning Regulations, Section 404.B).

As indicated in Section 1.0 (Description of Proposed Action) of this SEIS2, the maximum height of the wind turbine model currently under consideration is 492 feet. This height exceeds the existing maximum height limitation for wind turbines specified in the Town of Arkwright Local Law 2 of 2007, §659.A.13, which establishes that the maximum total height of any Wind Energy Conversion System (or wind turbine) shall be 420 feet. However, the Town has introduced legislation seeking to amend Section 659(A)(13) to allow WECS up to 500 ft. in height. If the Town does not approve the legislation, the Applicant will seek a variance pursuant to the Town's zoning law.

Additional setbacks and standards for WECs (wind turbines) specified in Town of Arkwright Local Law 2 of 2007 are as summarized in Section 2.13 of the DEIS.

2.13.1.3 Agricultural Land Use

As stated in Section 2.9 of this SEIS2, agriculture represents a significant component of the Chautauqua County economy. According to the U.S. Census of Agriculture (2012), 35.1% of the land in Chautauqua County is utilized for agriculture. Of this, 54.7% is used as cropland, 25.6% is used as woodland, 10.6% is used as pastureland, and 9.0 % is devoted to other agricultural uses. The NYSDAM designates Agricultural Districts throughout the state by county, the purpose of which are to support farms and farmland through a combination of incentives and protections intended to forestall the conversion of farmland to non-agricultural uses. As shown in Figure 22, portions of the Project Site are located within one agricultural district in the Town of Arkwright (Agricultural District #10) and one agricultural district in the Town of Pomfret (Agricultural District #9), which are designated in accordance with the NYSDAM program standards. Approximately 2,028 acres (52%) of the Project Site is located within these two districts (see Figure 22). Of this area, approximately 826.7 acres are currently utilized as active agriculture.

2.13.1.4 Mining and Natural Gas Use

As discussed in Section 2.1 of this SEIS2, the Project Site contains 61 natural gas wells (producing wells, non-commercial wells, and plugged and abandoned wells), as shown in Figure 7 of this SEIS2. However, consistent with the Project layouts presented in the DEIS and SEIS, all turbines in the SEIS2 Project layout have been sited in compliance with the 500 foot setback from gas wells required by local law which is fully protective as discussed below.

2.13.1.5 Future Land Use

A discussion of future land use within the vicinity of the Project is provided in Section 2.13.1.5 of the DEIS. Since the preparation of the DEIS, the Town of Pomfret has finalized a Comprehensive Agricultural Protection Plan, that was published in December of 2010. Considering the economic importance of agriculture in the area, the chief goals set forth by the plan are to preserve and promote the rural, agricultural character of the Town, and to protect, enhance, and expand the agricultural economy of the Town. The Findings and Recommendations section of the plan identifies the strong wind energy potential of the Town as a possible economic opportunity (Town of Pomfret Comprehensive Agricultural Protection Plan, 2010).

2.13.2 Anticipated Impacts

2.13.2.1 Construction

Potential impacts to land use resulting from Project construction are generally as described in the DEIS, albeit with a reduced number of turbines and overall reduction in anticipated land disturbance due to the reduced footprint of the Project in the SEIS2 Project Layout. A small amount of residential property could be temporarily impacted by noise, dust, and traffic delays associated with the Project construction. However, these impacts would generally be confined to the properties of participating landowners, and would be temporary in nature (i.e., limited to the duration of construction activity).

2.13.2.1.1 Regional and Local Land Use

A discussion of anticipated potential impacts to regional and local land use resulting from Project construction is provided in Section 2.13.2.1.1 of the DEIS, which indicates the Project is consistent with land use patterns in the both towns. The SEIS2 Project does not change the conclusions with respect to potential impacts to regional and local land use resulting from the Project.

2.13.2.1.2 Zoning and Other Applicable Laws

A discussion of anticipated potential impacts to zoning and other applicable laws resulting from Project construction is presented in Section 2.13.2.1.2 of the DEIS, which indicates that construction activities will be in compliance with local laws. This includes limiting construction activities to between the hours of 8:00 a.m. and 8:00 p.m., as required by the Town of Arkwright Local Law 2 of 2007, §659.A.14. However, a waiver will likely be requested to allow certain activities to occur outside these hours. Such activities are anticipated to be limited, and will not be conducted without advanced notice and approval by the Town. Otherwise, the SEIS2 Project does not change the conclusions with respect to potential construction-related impacts to zoning and other applicable laws and the SEIS2 Project will remain in compliance.

2.13.2.1.3 Agricultural Land Use

As described in Section 2.13.2.1.2 of the DEIS, construction of the Project will result in temporary disturbance to agricultural areas. Per the DEIS and SEIS, approximately 130 acres of agricultural land would have been disturbed to construct the proposed DEIS and/or SEIS Project Layouts. However, the SEIS2 Project Layout is anticipated to result in approximately 116 acres of temporary, and 12.5 acres of permanent construction-related disturbance to active agricultural land, all of which occur within agricultural districts 9 and 10. The SEIS2 Project Layout therefore reduces the area of temporary construction impacts to agricultural areas. Section 2.1 of this SEIS2 describes potential impacts to agricultural land in more detail. Furthermore, construction activities associated with generator lead line and substation facilities are not likely to conflict significantly with the Town of Pomfret's Comprehensive Agricultural Protection Plan as the generator lead line has been located in a manner to minimize potential impacts to agricultural fields and is generally consistent with the purposes and goals of the Plan.

2.13.2.1.4 Mining and Natural Gas Use

A discussion of potential anticipated impacts to mining and natural gas wells resulting from Project construction is presented in Section 2.13.2.1.4 of the DEIS. The SEIS2 Project is not expect to impact sand/gravel quarries or gas wells within the Project Site or vicinity. Project facilities have been sited to avoid potential impacts to gas infrastructure and facilities. The turbines in the SEIS2 Project Layout are all sited greater than 500 feet from the nearest gas well, in accordance with the Town of Arkwright Local Law 2 of 2007, §6662.E.6. As described in Section 2.10 of this SEIS2, tower collapses and/or blade failures are very rare and unlikely events, and are not anticipated for the proposed Project. However, in the event of such a failure, the proposed turbine height (492 feet) for the SEIS2 Project Layout remains less than the 500-foot setback from gas wells.

In addition, as described in Section 2.1 of this SEIS2, geotechnical investigations conducted for the SEIS2 Project Layout (see Appendix D of this SEIS2) indicate that blasting of near surface exposed rock and rock removal may be required for construction of the Project in some locations. Blasting may be necessary when bedrock is encountered at depths less than 10 feet below ground surface and in those instances when the bedrock is not rippable with an excavator or cannot be broken by pneumatic hammer. According to the geotechnical report, bedrock (shale) was encountered at a depth of exactly 10 feet at one of the potential turbine locations. While the report also stated that the upper few feet of shale bedrock is likely rippable, the results of the investigation suggest it is possible that blasting may be required in some locations. Although not anticipated, in the event that any blasting is necessary, these activities will be conducted in accordance with an approved blasting plan (see SESI2 Appendix A).

Furthermore, to ensure there are no impacts to existing utilities (including natural gas facilities), the Project's construction contractor will contact Dig Safely New York to confirm the locations of buried gas lines and other utilities prior to the start of construction.

2.13.2.1.5 Future Land Use

The construction of the proposed Project is not anticipated to significantly impact future land use within the vicinity of the Project.

2.13.2.2 Operation

2.13.2.2.1 Regional and Local Land Use

As described in Section 2.13.2.2.1 of the DEIS, Project operation will not significantly impact regional and local land use. Although the presence of wind turbines would alter the appearance of the landscape, this effect will be less than anticipated in the DEIS, due to the reduced number of wind turbines and reduced overall footprint of the SEIS2 Project Layout. The agricultural and rural nature of the landscape will not change as a result of Project operation. Otherwise, the SEIS2 Project does not pose the potential for new impacts that were not identified and analyzed in the DEIS/SEIS.

2.13.2.2.2 Zoning and Other Applicable Laws

With respect to the height of the turbines, the maximum height of the largest wind turbine that is being considered for the Project is 492 feet, which is in violation of the Town of Arkwright Local Law 2 of 2007, §659. Arkwright's ordinance establishes that the maximum total height of any WECS (or wind turbine) shall be 420 feet. When the Town's Wind Energy Facilities ordinance was passed in 2007, wind turbine heights were substantially shorter than what is currently the industry standard. Turbine technology has evolved and the general trend in the industry is to maximize efficient use of the wind resource by utilizing turbines that are taller and/or have larger rotor diameters. For example, the Applicant constructed the Marble River Wind Farm in Clinton County, New York, in 2011. The Marble River Project utilizes the 492-foot Vestas V112 turbine, which is comparable in height to the turbine currently proposed for the Arkwright Summit Wind Farm Project.

In recognition of this evolution in the latest technology and in the interests of maximizing the use of the renewable wind resource while also minimizing potential environmental impacts associated with the footprint of the Project, the Town of Arkwright Town Board has recently introduced an amendment to Section 659(13) of Article VI-A of the zoning ordinance which would increase the permissible height of any wind energy conversion system (WECS) to a maximum of 500 ft. The review of the amendment to the zoning ordinance is being conducted as part of the SEQRA review for the Project. As discussed elsewhere in this SEIS2, in short, the difference in potential visual and other impacts associated with the taller turbines, if any, particularly considering the reduced number of turbines, is outweighed by the fact that the reduction in the total number of turbines reduces potential environmental impacts associated with the Project.

The Project has a queue position with NYISO for a 78.8 MW project. The proposed use of taller, 2.0 and 2.2 MW turbines allows the Applicant to maximize the energy generation potential of the proposed Project within the constraints of their queue position with NYISO, while minimizing the number of proposed wind turbines, thereby minimizing potential environmental impacts associated with the construction and operation of a larger number of turbines. As noted above, the Town has recently introduced an amendment to Section 659(13) of Article VI-A of the zoning ordinance which would increase the permissible height of any wind energy conversion system (WECS) to a maximum of 500 ft. The taller turbines will generate substantially more electricity than shorter turbines, with only a minor increase in the footprint of disturbance associated with each turbine. In general, wind speeds increase at higher altitudes above the earth's surface. Analyses performed by the Applicant show an approximate 4% increase in wind velocity from 262 feet about ground to 305 feet above ground at the Project Site. Because of higher wind speeds at higher altitudes, this modest increase in turbine height from 420 feet to 492 feet is likely to result in up to an 8-10% increase in gross energy production. The increased generation capacity allows for fewer turbines to be constructed without reducing electrical output. Fewer turbines result in not only less impact from the turbine footprint itself, but also less area of impact resulting from the reduced number of required access roads and collection lines. This results in less impact to wetlands, forest land, agricultural land, and soils than would be expected from a project with a larger number of shorter turbines.

The SEIS2 Project Layout (with fewer turbines) would also benefit the community because turbines would be less dense on the landscape, and in proximity to fewer individual residences. Fewer taller turbines are also considered preferable from a visual impact perspective (Thayer and Freeman, 1987; van de Wardt and Staats, 1998), and can reduce noise impacts by increasing the distance between the source of the noise and the reception locations. Moreover, based on the distance of the turbines from off-site public vantage points, the difference of approximately 72 feet from the proposed maximum height assessed in the DEIS is unlikely to be perceptible to the ordinary viewer from ground level (see comparative visual simulations in Appendix J). Additional discussion of potential visual impacts is discussed in Section 2.5 of this SEIS. The ability to maximize the wind resource with taller turbines is consistent with the stated purpose of the Town's Wind Energy Facilities ordinance and is in the best interests of the Town.

The Applicant examined other alternatives and concluded that the revised Project layout, with 36 turbines at 492 feet blade tip height maximizes the benefits of the Project while generally reducing adverse environmental impacts to the greatest extent practicable. Please see Section 4 of this SEIS for a more detailed discussion of alternatives.

If the Town does not approve the legislation, the Applicant will seek a variance pursuant to the Town's zoning law relative to the height of the proposed wind turbines.

In addition, the Town of Arkwright Local Law 2 of 2007, §662 requires a setback for wind turbines of 1,200 or 200 percent of the total tower height, whichever is greater, from the boundaries of the County's existing or proposed trails, trail facilities, and recreation areas. As described in Section 2.11.1.6 and 2.11.2.6 of this SEIS2, there are three trails located within 1,200 of three of the proposed wind turbines (see Figure 19). As described in Section 2.11.2.2.6, no significant risks to the public are anticipated as a result of locating the wind turbines within 1,200 feet of county trails. The Applicant is seeking a variance pursuant to the Town's zoning law to resolve this non-compliance with the required setback.

2.13.2.2.3 Agricultural Land Use

A discussion of anticipated potential impacts to agricultural land use resulting from Project operation is provided in Section 2.13.2.2.3 of the DEIS. As discussed in the DEIS, the Project is likely to help keep land within agricultural use, which is consistent with the Town of Pomfret Agricultural Protection Plan (2010). Another benefit of the SEIS2 Project Layout is that it is anticipated to result in approximately 12.5 acres of permanent, operation-related disturbance to agricultural land, representing a reduction in potential impacts when compared with the DEIS and SEIS Project Layouts.

2.13.2.2.4 Mining and Natural Gas Use

Project operation is not anticipated to impact existing mines and natural gas wells within the Project area.

2.13.2.2.5 Future Land Use

As described in Section 2.13.2.2.5 of the DEIS, the proposed Project is not expected to interfere with future land uses. Construction and operation of the Project will result in local economic benefits, and is anticipated to help preserve farmland in its current agricultural use. As noted in the DEIS, the Project will have a positive impact on future infrastructure improvements within Arkwright, because revenues to the Town generated from the Project will enable improvements to Town-owned roads and other infrastructure. However, as discussed in the SVRA2 prepared for the Project (Appendix J) of this SEIS2, the Project would result in an alteration in the viewshed from various vantage points in the Project vicinity, which could impact the manner in which members of the public perceive the rural character of this community. The SEIS2 Project Layout minimizes those impacts by reducing the proposed number of turbines and reducing the total area of ground disturbance relative to the Project layout proposed in the DEIS and SEIS.

2.13.3 Proposed Mitigation

2.13.3.1 <u>Construction</u>

2.13.3.1.1 Regional and Local Land Use

Project construction will not result in adverse impacts to regional and local land use. The minor noise, dust and traffic delays that could temporarily affect residential properties will be mitigated through various on-site measures. See discussions of mitigation measures for dust, noise, and traffic delays cause by Project construction in Sections 2.4.3, 2.7.3, and 2.8.3, respectively.

2.13.3.1.2 Zoning and Other applicable Laws

The construction of the Project would comply with the local laws and zoning codes in both the Towns of Arkwright and Pomfret. Therefore, no mitigation is necessary or proposed.

2.13.3.1.3 Agricultural Land Use

A discussion of anticipated potential impacts to agricultural land use resulting from Project construction is provided in Section 2.13.3.1.3 of the DEIS. To minimize and/or mitigate impacts to active agricultural land and farming operations, Project siting and construction will fully comply with the NYSDAM Guidelines for Agricultural Mitigation for Windpower Projects (NYSDAM, 2013), which is included in Appendix R of this SEIS2. In addition, as noted previously, a discussion of proposed mitigation for potential temporary impacts to soils is provided in Section 2.1.2.3.1 of the DEIS. During construction, a qualified Agricultural inspector will be present during construction restoration activities that take place on agricultural land. The Project will also obtain coverage under a SPDES general permit. All work will be conducted in strict compliance with the provisions of the permit. For a detailed discussion of the proposed mitigation measures and associated best management practices, please see Section 2.1.2.3.1 of the DEIS. With the implementation of these measures, the SEIS2 Project Layout has minimized potential impacts to agricultural areas to the greatest extent practicable.

2.13.3.1.4 Mining and Natural Gas Use

As described above, the SEIS2 Project Layout has been sited to avoid impacts to existing mines and natural gas facilities. Furthermore, to ensure there are no impacts to existing utilities (including natural gas facilities), the Project's construction contractor will contact Dig Safely New York to confirm the locations of buried gas lines and other utilities prior to the start of construction. There are no anticipated impacts from Project construction to local quarries and/or natural gas infrastructures. Consequently, no mitigation measures will be necessary.

2.13.3.1.5 Future Land Use

As described above, there are no anticipated impacts to future land use resulting from Project construction. Consequently, mitigation measures will not be necessary.

2.13.3.2 <u>Operation</u>

2.13.3.2.1 Regional and Local Land Use

A discussion of the anticipated potential impacts to regional and local land use resulting from Project operation is provided in Section 2.13.3.2.1 of the DEIS. No additional mitigation measures are anticipated as the Project is consistent with existing land uses and compatible with the agricultural and rural residential land use that dominates the area.

2.13.3.2.2 Zoning and Other Applicable Laws

For the most part, the SEIS 2 Project Layout components will comply with local setback laws in both the Towns of Arkwright and Pomfret. However, the maximum height of the turbine model currently under consideration is 492 feet, which is in violation of the Town of Pomfret Local Law 2 of 2007, §659, which establishes that the maximum total height of any Wind Energy Conversion System shall be 420 feet. As described above, the Town of Arkwright Town Board has recently introduced an amendment to Section 659(13) of Article VI-A of the zoning ordinance which would increase the permissible height of any wind energy conversion system (WECS) to a maximum of 500 ft. The review of the amendment to the zoning ordinance is being conducted as part of the SEQRA review for the Project. If the Town does not approve the legislation, the Applicant will seek a variance pursuant the Town's zoning law.

In addition, as described above, the Town of Arkwright Local Law 2 of 2007, §662 requires a setback of 1,200 or 200 percent of the total tower height, whichever is greater, from the boundaries of the County's existing or proposed trails, trail facilities, and recreation areas. There are three turbines in the SEIS2 Project Layout sited within 1,200 feet of a county trail (see Figure 19). However, no interference with recreational use of these trails or potential hazard to the public are anticipated as a result of the proximity of the Project. The Applicant is seeking a variance pursuant to the Town's zoning law to resolve this non-compliance with the required setback.

2.13.3.2.3 Agricultural Land Use

A discussion of anticipated potential impacts to agricultural land use resulting from Project operation is presented in Section 2.13.3.2.3 of the DEIS. The SEIS2 Project Layout has been intentionally sited to minimize impacts to active agricultural land to the greatest extent practicable. Project siting has considered the recommendations included in the NYSDAM Guidelines for Agricultural Mitigation for Windpower Projects (NYSDAM, 2013), which is included in Appendix R of this SEIS2. In addition, as described in Section 2.1 of this SEIS2, the Project's environmental consultant met with NYSDAM staff to review the proposed SEIS2 Project Layout during a site visit on June 17, 2015. This review resulted in NYSDAM recommending proposed layout changes, which the Applicant reviewed with participating landowners.

The Applicant incorporated those recommendations requested by NYSDAM that were acceptable to landowners and/or that did not conflict with the locations of wetlands or other potential environmental impacts. With the incorporation of these measures, Project operation is not anticipated to result in significant impacts to agricultural land use and no mitigation measures are necessary.

2.13.3.2.4 Mining and Natural Gas Use

There are no anticipated potential impacts to mining and natural gas use as a result of Project operation. Therefore, no additional mitigation measure will be necessary.

2.13.3.2.5 Future Land Use

Operation of the proposed Project is consistent with future land uses anticipated within the Project area. As indicated above in Section 2.13.2.2.5 of this SEIS2, the visibility of the Project could impact the manner in which members of the public perceive the rural character of the community. Mitigation related to potential visual impacts is presented in the SVRA 2 (Appendix J of this SEIS2). It is also worth noting that the Project is compatible with the Town of Pomfret Comprehensive Agricultural Protection Plan (Wendel, 2010), which identifies strong wind energy potential in the town.

3.0 UNAVOIDABLE ADVERSE IMPACTS

As described in Section 2.9 of this SEIS2 (Socioeconomics), the proposed Project will result in significant long-term economic benefits to participating landowners, as well as to the Towns of Arkwright, Pomfret, the local school districts, and Chautauqua County. When fully operational, the Project will provide up to 78.6 MW of electrical power generation with no emissions of pollutants or greenhouse gases to the atmosphere. The development of the Project is consistent with surrounding land uses and may function to keep land within the generating portion of the Project in agricultural use, thus protecting open space and existing land use patterns.

Despite the positive effects anticipated as a result of the Project, its construction and operation will necessarily result in certain unavoidable impacts to the environment. The majority of these environmental impacts will be temporary, and will result from construction activities. However, long-term unavoidable impacts associated with operation and maintenance of the Project includes turbine visibility from some locations within the area. Project development will also result in an increased level of sound at some receptor locations (residences) within the study area (note, however, that Project sound levels are not expected to exceed 50 dBA at any non-participating residences), a minor loss of forest land, wildlife habitat changes, and some level of avian and/or bat mortality associated with bird/bat collisions with the turbines. As evaluated through site-specific expert analyses, which are presented in the DEIS, SEIS, and SEIS2 these impacts are not considered significant, and/or are outweighed by the benefits of providing a source of clean, renewable energy and displacing some of the energy (and emitted pollutants) created by fossil fuel generators, which result in significant environmental impacts (Driscoll et. al., 2007) and (NYSDEC, 2010b).

Although adverse environmental impacts will occur, they will be minimized through the use of various general avoidance and minimization measures, as well as site-specific mitigation measures. With the implementation of these measures, the Project is expected to result in positive, long-term overall impacts that will offset the adverse effects that cannot otherwise be avoided. Should avoidance mitigation measures fail and adverse impacts occur, the Applicant will evaluate the need for turbine specific scheduled curtailment of operations when it is deemed necessary to operate the project in a socially responsible manner.

The following subsections summarize general avoidance and minimization measures, which have been incorporated into the Project design, and specific mitigation measures proposed to offset adverse impacts to specific resources.

3.1 GENERAL MITIGATION MEASURES

General mitigation measures include compliance with the conditions of various local, state and federal regulations that govern Project development. See Section 3.1 of the DEIS for a list and discussion of these regulations.

3.2 PROPOSED MITIGATION MEASURES FOR LONG-TERM UNAVOIDABLE ENVIRONMENTAL IMPACTS

Despite the overall positive impact of the Project on the environment and community, the construction and operation of the Project will result in some temporary and long-term unavoidable adverse impacts that must be considered and addressed. A summary of mitigation for long-term unavoidable environmental impacts for each topic is provided below.

Soils, Geology, and Topography

To avoid impacts to soils and geology, the Applicant has utilized existing public and private roads (such as farm, gas well, and logging roads) when siting Project facilities wherever practicable. Furthermore, buried collection lines will be installed at depths and in locations that provide for long-term agricultural use above them. Roads and turbines have also been aligned at the edges of fields where possible to avoid impacting agricultural operations. The Project will comply with New York State Agricultural District Laws and Guidelines for Agricultural Mitigation for Windpower Projects to the maximum extent practicable.

Surface and Groundwater Resources

To avoid impacts to surface and groundwater within the Project Area, all Project facilities have been sited and aligned to minimize impacts to both wetlands and minimize stream crossings. Furthermore, impacts to water resources will be mitigated through the proposed development of a SWPPP based on best management practices related to erosion, spills, and excavation.

Biological Resources

In order to mitigate for impacts to Biological Resources, the Applicant has conducted extensive studies to assess the various species of wildlife within the vicinity of the Project, as well as those that migrate through the Project Site. Avian and bat studies conducted by the Applicant assessed the risks to these species and found them comparable to, or lesser than, other wind projects in New York State. The Applicant will collaborate with the NYSDEC and USFWS to develop and implement a detailed post-construction monitoring protocol to verify the consistency of predicted studies and develop further site-specific mitigation strategies if necessary.

Land Use and Zoning

As discussed in Section 2.13 of this SEIS2 (Land Use and Zoning), the proposed Project is consistent and compatible with current and future land uses and zoning regulations within the vicinity of the Project. In those instances where the Project is not in conformance with local zoning requirements (e.g., setbacks from County trails), the Applicant is seeking a variance pursuant to the Town's zoning code. Minor changes to existing land use within the Project Area are anticipated as a result of construction and operation of the Project due the conversion of some agricultural and forest land being converted into developed land. During operation, Project O&M staff will coordinate with local landowners to ensure that Project maintenance will not adversely impact seasonal agricultural activities. Furthermore, payments in lieu of taxes to host communities will function to assist them in providing services and other benefits to their residents, and should reduce the overall tax burden on property owners in those communities.

Cultural Resources

In order to mitigate potential impacts to cultural resources, the Applicant has corresponded with local historians and the SHPO. The Applicant has conducted archaeological surveys and an inventory local architectural resources based on SHPO guidelines for historic and archeological resources surveys. Project facilities have been intentionally sited to avoid impacts to archaeological resources. Furthermore, the Applicant has initiated consultation with the SHPO and Lead Agency to fund cultural resources mitigation projects that will benefit the local community.

Visual Resources and Noise

As discussed in Section 2.0 of this SEIS2, the residual noise and shadow flicker impacts have been conservatively estimated. With respect to noise, the ambient noise assessments conducted in the noise study utilized a measure of background noise well below average conditions. The study assessed the theoretical worst-case scenario (no leaves, no birds, no snow, and an omni-direction 6 m/s wind speed), which may exist for only a small fraction of the year, if at all. It was determined that even under these hypothetical worst case conditions, the noise impacts are within the limits established by local law.

With respect to both potential visual and sound impacts, the Applicant has established a neighbor program whereby non-participating landowners may be offered compensation. This program functions to share the benefits of the Project with the group of neighbors that may experience the most significant change in their neighborhood resulting from the Project. Such a program is not required by law and affirms the intent of the Applicant that those in the Project Area who may experience unavoidable impacts have the chance to participate in the Project. Further mitigation measures for impacts to visual resources undertaken by the Applicant to the maximum extent practicable include: Siting the Project away from population centers and areas of residential development, using minimal lighting requirements required by the FAA, siting turbine locations to minimize impacts from shadow flicker, and installing underground electrical collection lines between turbines, as opposed to overhead lines.

Communications

As discussed in Section 2.12 of this SEIS 2. Interference with microwave communication systems, television reception, LMR operations, AM/FM radio and cellular communication is not anticipated. However, if Project operation does for some unforeseen reason result in any impacts to existing communication transmissions, the Applicant is committed to addressing and resolving each individual reported problem as necessary. This will be accomplished via a Complaint Resolution Plan, as outlined in Appendix O of this SEIS 2. Available mitigation measures include the addition of transmitters or receiver antennas and installing cable or satellite television. Furthermore, if the FAA and DOD detect a possible conflict with military radar, the Project will work to resolve the conflict to the satisfaction of the involved federal agencies.

3.3 ENVIRONMENTAL COMPLIANCE AND MONITORING PROGRAM

After the completion of the SEQRA process and permits have been issued, but prior to construction, the Applicant will develop a construction and operation environmental compliance program. It is anticipated that this may include the Applicant employing at least one environmental inspector during construction to ensure compliance with the Project's environmental commitments and permit requirements. The Environmental Compliance and Monitoring Program will include components pertaining to planning, training of personnel, preconstruction coordination, construction and restoration inspection, restoration of public roads, ecological resource monitoring, and agricultural resource monitoring. With respect to ecological resources, the Applicant will develop a post-construction avian and bat monitoring plan in consultation with the USFWS and the NYSDEC.

3.4 CONCLUSION

Based on the SEIS2 layout and the recommended mitigation measures, the Project is expected to result in positive, long-term overall impacts that will significantly offset any unavoidable adverse effects.

4.0 ALTERNATIVES ANALYSIS

4.1 NO ACTION

The no action alternative assumes that the Project site would continue to exist as agricultural, forested, successional and rural residential land. This no action alternative would not affect on-site ambient noise conditions, construction traffic or public road conditions, wildlife or wildlife habitat, wetlands and streams, or television/communication systems, and would maintain community character, economic and energy-generating conditions as they currently exist.

Under this alternative, no wind turbines or infrastructure (e.g., roads, buried or above ground electrical interconnects, and substations) would be developed on the site. Consequently, none of the environmental impacts associated with Project construction and operation would occur. In addition, no economic benefits would accrue to the area. These unrealized economic benefits would include income from construction jobs, lease payments to the landowners, and annual PILOT payments to the affected town, school district, and county. Annual revenues to the towns of Arkwright and Pomfret, Chautauqua County, and the school district remain to be negotiated in the final terms of a PILOT agreement, but are anticipated to be approximately $4,000 per MW for the first year the Project is operational. In addition, the Applicant is currently discussing a Host Community Agreement with the Town of Arkwright, which will include additional financial benefits to the Town. Under the no action alternative, multiplier effects from these and other economic benefits would also not be realized. In addition, if the no action alternative is pursued, the lack of economic development resulting from Project construction and operation could result in undesirable impacts in the following areas:

- Loss of increased revenues to local taxing jurisdictions of over $640,000 per annum
- Loss of lease revenues for participating landowners of over $500,000 per annum
- Loss of income from operating and maintenance jobs of over $800,000 per annum
- Loss of payments to Project neighbors of over $100,000 per annum
- Loss of income from approximately 160 construction jobs

Furthermore, if the “no action” alternative were selected, the Project would not have the opportunity to support the recently announced State Energy Plan and related initiatives seeking to expand the base of electricity in New York State generated from renewable energy. The clean air and potential climate change fighting benefits of adding up to 78.6 MW of clean, renewable electric energy to the power grid would be lost, and reliance on fossil-fuel-fired generators, which contribute to emissions of sulfur dioxide (a precursor of acid rain), nitrogen oxide (a smog precursor), and carbon dioxide (a greenhouse gas) would continue unabated. If the no action alternative is pursued, the following positive environmental impacts associated with adding a new renewable energy source to the NYISO electric power system would not occur:

- A reduction of air emissions, specifically the displacement of 159 tons of NO_x and 420 tons of SO_2 during Project operation
- A reduction in the emission of greenhouse gases, specifically the displacement of 117,700 tons of CO_2 during Project operation
- A displacement of 5.7 pounds of Mercury
- A displacement of 1,289 tons of Mercury compounds

The no action alternative is also inconsistent with Article VI-A of the Town of Arkwright zoning law which designates commercial wind energy facilities (WECS) as a special permitted use. Given the short-term nature of anticipated construction impacts and the generally minor long-term impacts of Project operation, as compared to the significant economic, policy and environmental benefits that the Project would generate, the no action alternative is not considered a preferred alternative.

4.2 ALTERNATIVE PROJECT LOCATION

A discussion of the process by which the Applicant determined the site for the proposed Project is as described in Section 4.2 of the DEIS. The process of selection for a wind farm location is based on multiple factors that contribute to the operation of a facility in a technically and economically viable manner. These factors generally include the following:

- adequate wind resource
- adequate access to the bulk power transmission system, from the standpoints of proximity and ability of the system to accommodate the interconnection and accept and transmit the power from the Project
- contiguous areas of available land
- compatible land use
- willing land lease participants and host communities
- limited population/residential development
- limited sensitive ecological issues
- compliance with local, state, and federal laws and regulations

All of the above listed factors were strongly considered during the process of selection the location of the Project. Consequently, the current location of the Proposed Project reflects the best possible combination of these factors. The Project site is suitable for commercial scale energy production because of the presence of the wind resource, the presence of available land and willing landowners, the relative ease of access to the site, the proximity and the relative ease of connecting to the existing electric transmission grid. Also, it is worth noting that the Applicant is a private entity, without the power of eminent domain, and therefore, site alternatives analysis is properly limited to land controlled by the Applicant.

4.3 ALTERNATIVE PROJECT DESIGN/LAYOUT

In the process of arriving at the Project layout presented in this SEIS2, the Applicant has developed a number of different configurations, including those presented in the DEIS and SEIS. Each iteration of the Project layout has incorporated either major or minor adjustments according to the often dynamic criteria that are considered when siting the Project facilities. The primary criteria that are utilized in the process of siting Project facilities are listed below:

- Exposure to adequate wind resources
- Adherence to setbacks from homes, structures, roads, and property lines
- Sufficient spaces between turbines to maximize production and minimize turbulence
- Adherence to agricultural protection measures
- Setbacks from gas wells
- Avoidance of environmental, cultural, and other sensitive resources
- Avoidance of unstable land forms and other engineering constraints
- Landowner preferences
- Sensitivity to viewshed and noise issues

A preliminary layout of the Project was based on constraint information from a desktop review and wind resource data. A process of refinement was then initiated that included incorporating information from engineering and environmental work to account for wetlands and other significant natural resources. Additional changes to the Project layout were made to incorporate setbacks, turbine spacing, meteorological data, and landowner participation. This process resulted in the 47 turbine layout of the Project presented in the DEIS. Subsequent to the preparation of the DEIS, the applicant conducted numerous additional support studies to add further details on the location of environmentally sensitive areas, and re-evaluated the engineering design of the Project facilities. This resulted in the preparation of the SEIS, which presented a smaller 44 turbine layout that reduced the overall impact footprint of the Project from the DEIS.

Subsequent to the preparation of the SEIS, the Applicant has continued the process of revision by conducting additional support studies, continuing negotiations with land owners, and revising the engineering plans for the Project facilities. Furthermore, rapid improvements in wind turbine technology in recent years have allowed the Applicant to opt for taller, higher output capacity turbines compared to the models considered in the DEIS and SEIS (which were proposed in 2008 and 2009, respectively). Consequently, fewer turbines are required to achieve a similar nameplate capacity to the layouts presented in the DEIS and SEIS and maintain the positive benefits associated with the original proposed renewable energy output for the Project. The combination of the above mentioned factors has resulted in the 36 turbine layout presented in this SEIS2. This layout represents a significant reduction in both the number of turbines, and the Project impacts footprint when compared to the layouts presented in the DEIS and SEIS. Most notably, seven of the turbine locations proposed in the SEIS layout, which are located in the southeastern portion of the Project Site, have been eliminated. Otherwise, the proposed turbine locations in SEIS2 layout remain for the most part in close proximity to the turbine locations that were previously evaluated in the SEIS. Tables 34 and 235 below presents the differences between the Project layouts evaluated in the DEIS, SEIS, and SEIS2 with respect to Project facilities and temporary and permanent impacts. Further detail regarding these impacts is provided in Sections 2.1, 2.2, 2.3 and 2.13 of this SEIS2.

Table 34. Soil Disturbance Impacts by Project Component for DEIS, SEIS, and SEIS2 Project Layouts

	DEIS		**SEIS**		**SEIS2**	
	Temporary (acres)	**Permanent (acres)**	**Temporary (acres)**	**Permanent (acres)**	**Temporary (acres)**	**Permanent (acres)**
Turbines	212	8	198	8	155.8	15.2
Access Road	96	71	83	63	30.1	51.1
Improvements to Public Roads	No data	No data	4	4	No data	No data
Underground Collection Line	52	0	39	0	76	0
Substation/Switchyard	5	5	6	6	0.8	1.3
Overhead Collection Line, Transmission Line, and/or Generator Lead	0	0	8	<1	8.7	<1
Laydown Yard	10	0	8	0	17.4	0

O&M Building	0	0	9	9	0	2
Meteorological Towers	<1	<1	4	<1	0.9	0.1
Total	**375**	**89**	**359**	**90**	**289.5**	**69.5**

Table 35. Natural Resources Impacts for DEIS, SEIS, and SEIS2 Project Layouts

	DEIS		SEIS		SEIS2	
	Temporary (acres)	**Permanent (acres)**	**Temporary (acres)**	**Permanent (acres)**	**Temporary (acres)**	**Permanent (acres)**
Soil Disturbance	375	89	359	90	289.5	69.5
Vegetation	464	171	359	90	528.5	69.5
Agricultural Land Use[1]	133	70	62.5	18.6	116	12.5
Prime Farmland Soil	62.8	17.2	78.6	27.8	52.5	16.7
Wetlands	13.6	1.6	12.3	1.3	43.18	5.78

[1] Agricultural land use was determined using NLCD data in the DEIS and SEIS. For the SEIS2, agricultural land use was determined using aerial imagery and was verified with field surveys.

As evidenced by Tables 34 and 35, if the Project were to continue to use smaller turbines as proposed in the DEIS and SEIS, the number of turbines required to meet the Project's stated purpose, need and benefits would increase. The use of a greater number of smaller turbines may have the effect of reducing visibility, but as discussed in Section 2.5 of this SEIS2, this impact is expected to be negligible. Also, smaller turbines would require more participating parcels of land, which results in additional impacts to other resources due to ground and vegetation disturbance and particularly more wetland disturbance and impacts (more project roads, more electrical lines and additional land disturbance).

As noted above, the layout represents significant effort in analyzing the development potential of the site, landowner participation, wind resource assessment and a review of the site's zoning constraints. The current layout represents a balance between renewable energy production and avoidance of environmental impacts. Significant relocation of any of the turbines to a site other than the one of the identified locations would significantly complicate development across the Project and could potentially create different or new impacts than originally proposed at other locations. Therefore, reduction of environmental impacts through significant modifications of turbine location at a few locations is not feasible. Moreover, in the case of potential visual impacts, reduction in number of turbines by a few is unlikely to have any significant change in Project visibility or visual impact from most locations. Similarly, the proposed generator lead in the SEIS2 layout includes taller, but significantly fewer, pole structures. In addition, overhead collection lines proposed in the SEIS have been removed from the Project layout. Overall, the proposed generator lead in the SEIS2 is not expected to have a significant change in visual impact relative to the transmission line evaluated in the SEIS.

Finally, the Applicant has proposed 38 turbine sites but ultimately proposes to develop 36 turbines. The alternative turbine sites were identified based on the siting constraints and factors discussed in this section. The Applicant selected more sites than proposed turbines to provide additional flexibility in choosing sites that balance the Applicant's goals with respect to energy generation, but also avoiding and minimizing potential environmental impacts. The final selection of the 36 turbines to be constructed from the 38 turbine locations evaluated herein will be determined prior to construction. It is also worth noting that the Applicant has proposed a mix of 2.0 and 2.2 MW turbines to maximize potential energy production within the constraints of their approved interconnection agreement while minimizing the number of proposed wind turbines.

4.4 ALTERNATIVE ENERGY PRODUCTION TECHNOLOGIES

An extensive discussion of alternative energy production technologies is provided in Section 4.4 of the DEIS. It is the Applicant's purpose to generate electricity from wind. Even if the applicant had a more broadly defined purpose, such as to generate renewable energy from any technology that could qualify under the New York State RPS, the alternative technologies available to the Applicant to achieve this purpose are limited, and none are reasonable alternatives given the capabilities of the Applicant. The Applicant does not currently operate any coal facilities that can be co-fired with biomass and no portfolio of hydroelectric facilities that can be developed or expanded.

4.5 ALTERNATIVE TURBINE TECHNOLOGY

A discussion of the various wind turbine technologies considered by the Applicant for the Project is provided in Section 4.5 of the DEIS. A variety of wind turbine technologies such as vertical axis turbines, two-bladed turbines, and significantly smaller turbines have been evaluated. However, the three-bladed, upwind, horizontal axis, propeller-type wind turbine has been determined to be the most reliable and commercially viable technology for the application of utility scale electrical power generation. Since the preparation of the DEIS and SEIS, the Applicant has revised the wind turbine model being considering for the Project from the Vestas V-90 to a combination of the Vestas V110 – 2.2 MW and the Vestas V110 – 2.0 MW. As shown in Table 1 in Section 1.0 (Project Description) of this SEIS 2, the Vestas V110 is larger wind turbine than the Vestas V-90 with respect to hub height, rotor diameter, and total height. The Vestas V110 also has a higher production capacity than the Vestas V-90. Fewer turbines are proposed in the current layout as a result of the increased nameplate capacities of the larger wind turbine. Taller turbines can create the potential for impacts due to setback issues, the potential for increased visibility, and higher rotor swept zones. However, when compared to a larger number of shorter turbines, the overall benefits associated with the energy production at the taller height and the net reduction of impacts due to fewer turbines outweigh the relatively minor differences in potential environmental impacts associated with the increased wind turbine dimensions.

4.6 ALTERNATIVE PROJECT SCALE AND MAGNITUDE

A discussion regarding alternative scales and magnitudes considered for the Project is provided in Section 4.6 of the DEIS. Since the preparation of the SEIS, the Applicant has reduced the size of the Project from 44 wind turbines to 36 turbines as presented in this SEIS2. The current SEIS2 layout of the Project is considered by the Applicant to achieve the optimal balance between economic viability, limited impacts to environmental resources, and electricity production goals.

4.7 ALTERNATIVE PROJECT TIMING

A discussion of the factors and events that dictate the timing of the development of the Project is provided in Section 4.7 of the DEIS. These factors are both external and internal in nature, with external factors including securing sufficient equipment, and acquiring regulatory approvals, while internal factors include decisions by the applicant to prioritize where to focus its available resources. A preliminary construction schedule for the Project as presented in this SEIS2 is provided in Table 2 in Section 1.0 of this SEIS2.

4.8 ALTERNATIVE MITIGATION STRATEGIES

Section 2.0 of this SEIS 2 describes the anticipated impacts and corresponding proposed mitigation measures for each environmental resource based on the currently proposed Project layout. The applicant has paid close attention to defining each environmental resource and land use constraint and siting the Project facilities so as to avoid or minimize impacts to them. For any resource or land use constraint areas that cannot avoided, mitigation measures have been developed by the Applicant in coordination with agency staff, local officials, and affected stakeholders. A wide range of options were considered by the Applicant when developing these mitigation measures. The mitigation plan that has resulted from these efforts minimizes impacts both during construction and operation of the Project, and allows for flexibility to adapt to unforeseen impact conditions that may be encountered.

5.0 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

The anticipated irreversible and irretrievable commitment of resources associated with the proposed Project are largely as described in Section 5.0 in the DEIS. The reduction in the number of proposed wind turbines for the revised SEIS2 Project layout has resulted in a decrease of the total acres of land under agreement for Project development (from 5,950 to 3,883), and also a decrease in the operational footprint of the Project. The expenditure of between four and eight million dollars and human resources of over 25 person years (excluding equipment manufacturer) will continue to be required throughout the permitting and construction phases of the Project.

6.0 GROWTH INDUCING IMPACTS

Growth inducing impacts associated with the development, construction, and operation of the Project are largely as described in Section 6.0 of the DEIS. The Project is not anticipated to result in long-term population growth within the vicinity of the Project area. Consequently, there will be no significant increase in the need for existing government and social resources (i.e. police, fire, hospitals, school systems, etc.). However, the presence of the construction workforce will likely boost the local economy for a short time through the purchase of goods and services. The Project is anticipated to result in some improvements to infrastructure in the form of enhancements to select local roads and increased reliability of the local electrical system. The Project will also serve as a source of local revenue in the form of royalty payments to landowners that host Project facilities, and payments in lieu of taxes to local communities. For a more detailed discussion of the anticipated economic impacts of the Project, see Section 2.9 Socioeconomics.

7.0 CUMULATIVE IMPACTS AND BENEFITS

In accordance with 6 NYCRR § 617.9(b)(5)(iii)(a), SEQRA requires a discussion of cumulative impacts where such impacts are "applicable and significant." Cumulative impacts are two or more individual environmental effects which, when taken together, are significant or that compound or increase other environmental effects. The individual effects may result from a single project or from separate projects.

Where individual effects of the Project may interact with other effects of the Project, such potential cumulative impacts have been individually addressed in Section 2 of this SEIS2.

This section addresses the potential cumulative impacts that may arise from interactions between the impacts of the Project and the impacts of other projects. In general, cumulative impact analysis of external projects is required where the external projects have been specifically identified and either are part of a single plan or program, or there is a sufficient nexus of common or interactive impacts to warrant assessing such impacts together. Some cumulative impacts are the simple additive effect of the projects (i.e., each will disturb a certain amount of ground surface, wetlands, or natural communities). These additive impacts can be quantified by simply tallying the total impacts resulting from each project, to the extent that such information is known and has been publicly presented. Certain other cumulative impacts may not simply be additive and therefore need a certain level of further analysis. The subsections below discuss whether there are existing and proposed projects for which a cumulative impact analysis is required, and assess the extent to which the impacts of such projects will be cumulative with the impacts of the Arkwright Summit Wind Farm.

7.1 OTHER DEVELOPMENT PROJECTS

Across New York State, numerous wind-powered generating facilities have been constructed and are operational, while others are in the project planning and development phases. The closest operational Projects are First Wind Steel Winds and Noble Bliss Wind Park located approximately 35 miles and 55 miles from the Arkwright Summit Wind Farm respectively. These operating projects are too distant to pose the potential for significant adverse cumulative impacts.

The remainder of this section involves Projects which have been proposed and are in various forms of the "development" stage or have ceased development by virtue of their place in the NYISO interconnection queue. The review and approval status of projects that are still in the planning and development phase is highly variable, ranging from preliminary site investigations to those with completed system reliability impact studies (a requirement of the

NYISO), detailed project plans, and landowner agreements. For purposes of a cumulative impact analysis, it is difficult to assess the likelihood of cumulative impacts for projects that are in development and that may never achieve operation or are too preliminary to assume that they will achieve operation. Thus, this analysis of cumulative impacts of projects in "development" is conservative.

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

Section 7.0 of the DEIS and SEIS identifies other proposed projects that were listed in the NYISO queue at the time those documents were prepared. Table 36 below lists all of the regional proposed and existing projects, including those identified in Section 7.0 of the DEIS and SEIS, and their current status.

Table 36. Proposed and Existing Wind Projects in the Vicinity of the Arkwright Summit Wind Project

Project Name	Project as Described in DEIS/SEIS	Proximity to Arkwright Summit Wind Project	Current Status
Noble Environmental Power, LLC - Ball Hill Windpark	NYISO request 7/21/06 for 99 MW. Proposed in service date: 10/2008	Approximately 7 Miles	Project Purchased by RES America Developments, LLC. Request changed to 120 MW. Proposed in service date: 09/2017
Babcock & Brown, LP - Ripley Westfield Wind	NYISO request 8/14/07 for 124 MW. Proposed in service date: 12/2009	Approximately 20 Miles	Project removed from NYISO Queue
Babcock & Brown, LP - State Line Wind	NYISO request 12/20/2007 for 124.8 MW. Proposed in service date: 12/2010	Approximately 20 Miles	Project removed from NYISO Queue

First Wind - Steel Winds Project	30 MW Wind Project. In service date: 04/2007	Approximately 35 Miles	Project operational since 2007
Babcock & Brown, LP - Concord Wind	NYISO request 2/28/08 for 101.2 MW. Proposed in service date: 09/2011	Approximately 30 Miles	Project removed from NYISO Queue
Horizon Wind Energy, LLC - Pomfret	NYISO request 03/27/08 for 73.5MW. Proposed in service date: Unknown	Approximately 1 Mile	Project removed from NYISO Queue
EverPower Wind Holdings, Inc. - Cassadaga Wind, LLC	NYISO request 07/19/12 for 126 MW. Proposed in service date: 10/2015	Approximately 2 Miles	Project under development

As previously mentioned, the Steel Winds Project has been in operation for approximately 8 years and is located along the Lake Erie shoreline, approximately 35 miles northeast of the town of Arkwright. The Ripley Westfield Wind, State Line Wind, Concord Wind, and the Horizon Wind Energy Projects Identified in the above table have been removed from the NYISO Queue and are no longer in the planning and development phase. Consequently, these projects are not included in the cumulative analysis in the SEIS2.

The proposed Ball Hill Wind Project is located in the Towns of Hanover and Villenova, which are adjacent to the Town of Arkwright. The Ball Hill Wind Project has not identified the number or locations of turbines, the locations of other project components, or a general project area. However, it is likely that the Ball Hill Project will be located between 2 and 10 miles from the Arkwright Summit Wind Project.

Additionally, the Cassadaga Wind Project is located in close proximity to the Arkwright Summit Wind Farm. The Cassadaga Wind Project is being reviewed under Article 10 of the Public Service Law, and is being developed by Cassadaga Wind LLC, a subsidiary of EverPower Wind Holdings, Inc. (EverPower). Neither EverPower nor Cassadaga Wind LLC are affiliated with EDPR or Arkwright Wind LLC. In accordance with Article 10, EverPower prepared a Public Involvement Program (PIP) plan, the first step in the pre-application phase of the Article 10 process, which was filed with the New York Board on Electric Generation Siting and the Environment (Siting Board). The PIP was finalized and filed by EverPower on January 4, 2015. A Preliminary Scoping Statement (PSS) was subsequently filed with the Siting Board on September 3, 2015. According to the information provided in the PIP and PSS, the Cassadaga Wind Farm is located south of the Arkwright Summit Wind Farm, primarily within the Towns of Cherry Creek and Charlotte, and a small portion of Arkwright in Chautauqua County. The Project proposes to interconnect with the New York State electric grid in the Town of Stockton. The Project has not identified turbine locations or the location of other Project components, but the project sponsor has provided a broad “project area” map indicating the location of potential project components. Based on the broadly defined, “project area”, the northern boundary of the Cassadaga Wind project area is approximately 2 miles due south of the southernmost turbine location of the Arkwright Summit Wind Farm (see Figure 23 of this SEIS2), which represents the shortest possible distance between the two Projects.

The PSS for the Cassadaga Wind Project indicates that project is proposed to generate up to 126 MW of electricity, and includes up to 62 wind turbines, together with the associated collection lines (below grade and overhead), access roads, meteorological towers, and operation and maintenance (O&M) building. To deliver electricity to the New York State power grid, the PIP also indicates that EverPower proposes to construct a collection substation, a 5.5-mile long 115 kV electrical transmission line and a substation, which will interconnect with National Grid’s Dunkirk-Moon 115 kV transmission line.

As mentioned above, the PIP or PSS do not provide turbine locations, or identify the location of any other components of the Cassadaga Wind Project. Rather, these documents identify a “Project Area”, which is depicted in Figure 23 of this SEIS2. In addition, these documents indicate that the project’s interconnection will be in the Town of Stockton, southwest of the Cassadaga Project Area and at least 6 miles south of the proposed Arkwright Summit Wind generator lead and substation. Therefore, there will be no cumulative effects related to the Projects’ proposed interconnection/transmission facilities.

Due to the distances between the proposed Arkwright Summit Wind Project, Cassadaga Wind Project, and Ball Hill Wind Project, cumulative impacts resulting from construction and operation of the Projects are possible. Cumulative impacts to local roads and bridges could be possible due to construction-related transportation activities. Such impacts would only occur if the same transportation routes were used and if construction schedules overlapped. Currently, the Arkwright Wind Project is scheduled to commence construction in the summer of 2016. No such timeframe currently exists for the proposed Ball Hill Wind Project, although the proposed in-service date is September, 2017. With respect to the Cassadaga Wind Project, under the soonest timeframes available under Article 10, it is unlikely that the Project will be in construction in the summer of 2016. Moreover, at this point, given the fact that the “project area” has been broadly defined and does not contain exact locations for turbines and other Project components, it is premature to assume that the construction of the two projects would utilize similar local roads. However, should this situation arise, consultation with the involved project developers would be conducted to coordinate the transportation routes to minimize the extent of the impact and assure road repair and restoration is accomplished at the appropriate time, in consultation with the affected jurisdictions. In addition, given the distance between the three projects, it is unlikely that cumulative impacts associated with construction noise or dust will exist.

With respect to operation, even without information regarding the location of Project components for the Cassadaga and Ball Hill Projects, it is anticipated that the distance between the three projects would prevent any cumulative noise and shadow flicker impacts. There are no residences that are in both the Arkwright and Cassadaga Wind Project areas, and the proposed Ball Hill Project is entirely within the towns of Villenova and Hanover. Cumulative impacts occurring as a result of the simultaneous operation of the three projects are anticipated to be limited to those occurring to visual and avian/bat resources. As described in Section 2.5 of the DEIS, SEIS, and SEIS2, the visibility and visual effect of the Project will be highly variable based on viewing distance, viewer orientation, and the number of turbines visible, as well as the potential screening effects of topography and vegetation. If the Cassadaga or Ball Hill Projects are visible from a vantage point within the Arkwright Summit Wind Farm Project Site, they will typically be background features in any foreground or middleground view that includes the Arkwright turbines. From larger distances, the three Projects may appear to be a single larger Project. However, the visual effect of all three Projects at longer distances (i.e., greater than 5 miles) will be relatively minimal due to the effects of distance.

With respect to the potential for cumulative impacts to avian and bat species, since the preparation of the DEIS and SEIS there have been additional studies of operational wind projects in the Northeastern U.S. that allow for an assessment of potential cumulative impacts from wind projects operating in close proximity to each other in western New York. As described in Section 2.3.2.2 of this SEIS2, the results of a review of bird and bat mortality rates at six operating wind projects within 50 miles of the Arkwright Summit Wind Project indicate that mortality to between approximately 2 and 8 bats and 1 to 3 birds per MW per year are expected as a result of operation of the Project. Given that the Arkwright Summit Wind Project will have an operating capacity of 78.6 MW, mortality rates of between approximately 157 to 629 bats and 79 to 236 birds per year are anticipated as a result of Project operation. Considering the close proximity (shortest distance of 2 miles) of the proposed Cassadaga Wind Project and Ball Hill Wind Project to the Arkwright Summit Wind Project, it is expected that the same bird and bat mortality rates anticipated for the Arkwright Summit Wind Project would apply to the Cassadaga and Ball Hill Projects. Consequently, given the proposed 126 MW operating capacity of the Cassadaga Wind Project, mortality rates of between approximately 252 to 1008 bats and 126 to 378 birds per year are expected as a result of operation of the Cassadaga Wind Project. Given the proposed 120 MW operating capacity of the Ball Hill Wind Project, mortality rates of between approximately 240 to 960 bats and 120 to 360 birds per year are expected as a result of operation of the Ball Hill Wind Project. If the anticipated impacts to birds and bats from all three projects are combined, mortality rates of between approximately 649 to 2597 bats and 325 to 974 birds per year are anticipated from the simultaneous operation of the three Projects. However, it is worth noting that these estimates do not consider site-specific factors such as habitat availability, proximity to water sources, or other factors that affect bird and bat use of the Project sites in question. Therefore, the potential cumulative impacts described herein are conservative and likely overstate potential impacts.

Additionally, any potential long-term cumulative impacts are likely to be associated with the loss of existing wetlands and wildlife habitat within the development footprint of the three projects. A quantifiable account for this impact is not possible at this time given the limited information available regarding the Cassadaga and Ball Hill Projects. Nevertheless, given the relatively small area proposed for the Cassadaga Wind Farm in the Town of Arkwright, and the fact that the proposed Ball Hill Project occurs entirely outside of the Town of Arkwright, it is not anticipated that the combined footprints of the Projects will have a significant cumulative impact on these local resources.

Positive cumulative impacts associated with these combined projects are related to air quality improvements through the displacement of other polluting energy sources with windpower, and better meeting the state's RPS requirements and other related federal and state energy policy goals. Additional cumulative impacts include the economic benefits to the region that may be realized by the addition of income to participating landowners, the increased number of construction and operation employment opportunities, and the monies received by the host community in the form of the PILOT agreement.

8.0 EFFECTS ON USE AND CONSERVATION OF ENERGY RESOURCES

Global climate change has been recognized as one of the most important environmental challenges of our time. (See New York State Climate Action Plan Interim Report, November 2010; DEC's Commissioner Policy 49, issued October 22, 2010; DEC Guidance Assessing Energy Use and Greenhouse Gas Emissions in Environmental Impact Statements, issued July 15, 2009). There is scientific consensus that human activity is increasing the concentration of greenhouse gases (GHGs) in the atmosphere and that this, in turn, is leading to serious climate change. By its nature, climate change will continue to impact the environment and natural resources of the State of New York. (See DEC Guidance). Historically, New York State has been proactive in establishing goals to reduce GHG emissions, including Executive Order 24, which seeks to reduce GHG emissions by 80% by the year 2050 and also includes a goal to meet 45% of New York's electricity needs through improved energy efficiency and clean renewable energy by 2015. (See New York State Executive Order 24). The overwhelming majority of CO2 emissions in New York – estimated at approximately 250 million tons of CO2 equivalent per year- from result fuel combustion. Overall fuel combustion accounts for approximately 89% of total GHG emissions in New York State.

In an effort to encourage and incentivize the shift of New York State's energy sector from reliance on GHG emitting fuel sources to renewable energy sources, the State has established a Renewable Portfolio Standard (RPS) which initially called for an increase in renewable energy used in the State to 25% by the year 2013 (PSC, 2004). Following a comprehensive mid-course review and in an effort to further spur renewable energy project development, in an Order issued in January 2010, the New York Public Service Commission (PSC) expanded the RPS target from 25% to 30% and extended the target date from 2013 to 2015. The RPS is expected to reduce CO2 emissions by 50 million tons over the life of the projects (NYSERDA, 2015).

Electricity generated from zero-emission wind energy can displace the electricity generated from conventional power plants, thereby reducing the emissions of conventional air pollutants, such as sulfur and nitrogen oxides (acid rain precursors); mercury, and carbon dioxide (linked to global climate change). Displaced emissions occur because renewable electric generation sources have low marginal operating costs (i.e., fuel). Therefore, renewable energy sources become "must run" sources, displacing generation at fossil fuel plants that have higher marginal operating costs.

The proposed Project will have significant, long-term beneficial effects on the use and conservation of energy resources. The operating Project will contribute up to 78.6 MW of electrical generating capacity without consuming cooling water or emitting pollutants. Total net electricity delivered to the existing New York power grid is expected to be approximately 227,217 megawatt hours (MWh) (i.e., (33 turbines x 2.2 MW + 3 turbines x 2.0 Mw) x 24 hours/day x 365 days x 33% NCF), or enough electricity to meet the average annual consumption of 31,558 households, based on the average annual electric consumption of 7.2 MWh for New York State residences (U.S. Energy Information Administration [USEIA], 2015).

The Project will add to and diversify the state's sources of power generation, accommodate future growth in power demand through the use of a renewable resource (wind), and over the long term will displace some of the state's older, less efficient, and dirtier sources of power. Wind energy generation results in reductions in air emissions because of the way the electric power system works. Generally, the most expensive power sources will be "backed down" when there is a sufficient source of wind energy available. Given the mechanism that governs the operation of the New York electricity markets, wind energy is a preferred power source, on the day ahead markets, on an economic basis because the operating costs to run the turbines are low and there are no fuel costs. Therefore, wind turbines produce power that reduces the need for generation from individual fossil fuel-fired power plants or units, thereby reducing fuel consumption and the resulting air emissions that would have otherwise occurred (Jacobson and High, 2008).

On June 25, 2013, President Obama announced the Climate Action Plan, a national plan for tackling climate change. The three sections of the Plan focus on 1) steps to cut carbon pollution in the United States, including standards for both new and existing power plants, 2) actions to prepare the U.S. for the impacts of climate change, and 3) plans to lead international efforts to address global climate change. The Plan directs the Environmental Protection Agency (EPA) to establish the first ever restrictions on carbon pollution from power plants, the largest source of unregulated CO2 emissions in the U.S. It also fast-tracks permitting for renewable energy projects on public lands; increases funding for clean energy technology and efficiency improvements; calls for improved efficiency standards for buildings and appliances, as well as heavy trucks; establishes the first-ever Federal Quadrennial Energy Review to encourage strategic national energy planning; and outlines plans for cutting greenhouse gas emissions from hydrofluorocarbons and methane. The Plan states, "With abundant clean energy solutions available, and building on the leadership of states and local governments, we can make continued progress in reducing power plant pollution to improve public health and the environment while supplying the reliable, affordable power needed for economic growth. By doing so, we will continue to drive American leadership in clean energy technologies" (Executive Office of the President, 2013).

In fulfillment of President Obama's commitment under the 2013 Climate Action Plan, EPA proposed "Clean Power Plan" regulations in 2014 establishing a framework for states to regulate carbon dioxide emissions from existing fossil fuel-fired electric generating units. (See 79 Federal Register 34830; June 18, 2014). Once the guidelines are issued, states must develop plans that explain how they will achieve those guidelines. Nationwide, the proposal calls for reducing CO_2 from the power sector by approximately 30% from 2005 emission levels by 2030. The proposal establishes emission rate-based CO_2 goals for each state as well as guidelines for the development, submission and implementation of state plans to achieve those goals. The proposal relies on four basic building blocks: (1) reducing the carbon intensity of generation at individual units through heat rate improvements; (2) substituting less carbon-intensive generating units (e.g., replacing coal with natural gas); (3) increasing reliance on low or zero-carbon generation sources such as solar and wind; and (4) increasing reliance on demand-side energy efficiency programs. Each state must then develop a plan that explains how they intend to achieve their state-specific CO_2 emission rate goal that includes enforceable CO_2 emission limits applicable to each affected unit. EPA plans to finalize the rule by summer 2015; state plans would be due by June 30, 2016. States would be expected to begin making CO_2 emission reductions by 2020, with full compliance to be achieved by 2030.

In support of the President's efforts to diversify the U.S's clean energy mix, the U.S. Department of Energy (2015a) recently issued its "Wind Vision" which concluded that the benefits of wind energy are substantial and include:

- **Wind energy is available nationwide.** The Wind Vision Report shows that wind can be a viable source of renewable electricity in all 50 states by 2050.
- **Wind supports a strong domestic supply chain.** Wind has the potential to support over 600,000 jobs in manufacturing, installation, maintenance, and supporting services by 2050.
- **Wind is affordable.** As wind generation agreements typically provide 20 year fixed pricing, the electric utility sector is anticipated to be less sensitive to volatility in natural gas and coal fuel prices with more wind. By reducing national vulnerability to price spikes and supply disruptions with long-term pricing, wind is anticipated to save consumers $280 billion by 2050.
- **Wind reduces air pollution emissions.** Wind energy can help avoid the emission of over 250,000 metric tons of air pollutants, which include sulfur dioxide, nitric oxide, nitrogen dioxide, and particulate matter, as well as 12.3 gigatonnes of greenhouse gases by 2050.
- **Wind energy preserves water resources.** By 2050, wind energy can save 260 billion gallons of water—the equivalent to roughly 400,000 Olympic-size swimming pools—that would have been used by the electric power sector.
- **Wind deployment increases community revenues.** Local communities will be able to collect additional tax revenue from land lease payments and property taxes, reaching $3.2 billion annually by 2050.

In addition to helping achieve the State and Federal goals described above, implementation of the proposed action will result in other environmental benefits, which are highlighted below.

- Within the New York electricity market, wind-generated electricity typically displaces the use of fossil fuels in conventional power plants, producing a reduction in the emission of key air pollutants; sulfur dioxide and nitrogen oxides (acid rain precursors); mercury; and carbon dioxide (a contributor to global climate change). NYSERDA found that if wind energy supplied 10% (3,300 MW) of the state's peak electricity demand, 65% of the energy it displaced would come from natural gas, 15% from coal, and 10% from electricity imports. This equates to an annual displacement of 6,400 tons of nitrogen oxides and 12,000 tons of sulfur dioxide (GE Energy, 2005).
- Energy efficiencies and renewable generation together will reduce New York's greenhouse gas emissions, helping to achieve the State's CO2 reduction goals (NYSEPB, 2009, 2014).
- The well-being of some ecosystems in the northeastern U.S., including New York State, is at serious risk as a result of the negative environmental externalities associated with fossil fuel based power plant emissions. Research conducted by scientists from the Hubbard Brook Research Foundation concluded that "hotspots" throughout the Northeastern U.S. have levels of mercury deposition "10 to 20 times higher than pre-industrial conditions, and 4 to 5 times higher than current EPA estimates". This research highlights "the connection between airborne mercury emissions from United States sources and the existence of highly contaminated biological hotspots…Emission reductions from high-emitting sources near biological hotspots in the United States will yield beneficial improvements in both mercury deposition and mercury levels in fish and wildlife" (Driscoll et al., 2007).
- The Project will not require to use of water or water resources to generate electricity. Protection/conservation of surface and groundwater resources is a significant environmental concern and the development of electricity generation that is not reliant on water resources is extraordinarily important.

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