

DRAFT ENVIRONMENTAL IMPACT STATEMENT
FOR THE
HORSE CREEK WIND FARM

Town of Clayton
Jefferson County, New York

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ACRONYMS AND ABBREVIATIONS USED IN THE DEIS

amsl	above mean sea level	NYCRR	Official Compilation of Codes, Rules, and Regulations of the State of New York
APLIC	Avian Power Line Interactions Committee	NYS	New York State
AWEA	American Wind Energy Association	NYSA&M	New York State Department of Agriculture and Markets
AusWEA	Australian Wind Energy Association	NYSDEC	New York State Department of Environmental Conservation
BBA	Breeding Bird Atlas (New York State)	NYSDOT	New York State Department of Transportation
BBS	breeding bird survey	NYSEG	New York State Electric & Gas
BIN	Bridge Identification Number	NYSERDA	New York State Energy Research and Development Authority
CSD	central school district	NYSDPS	New York State Department of Public Service
cy	cubic yard	NYSORPS	New York State Office of Real Property Services
dBa	decibels, A-rated	NWCC	National Water and Climate Centers and/or National Wind Coordinating Committee
CME	Creighton Manning Engineers	OPRHP	Office of Parks, Recreation & Historic Preservation (New York State)
CMP	corrugated metal pipe	OSHA	Occupational Safety and Health Administration
DEIS	Draft Environmental Impact Statement	O&M	Operations and Maintenance
DOD	Department of Defense (U.S.)	PCS	personal communication system
DOE	Department of Energy (U.S.)	PSC	Public Service Commission
EAF	Environmental Assessment Form	PILOT	payment in lieu of tax
ECL	Environmental Conservation Law	REPP	Renewable Energy Policy Project
EDR	edr Companies	RPTL	Real Property Tax Law
EMF	electromagnetic field	SEQRA	State Environmental Quality Review Act
FAA	Federal Aviation Administration	SHPA	State Historic Preservation Act
FA	Fisher Associates	SHPO	State Historic Preservation Office (New York)
FEIS	Final Environmental Impact Statement	SPDES	State Pollutant Discharge Elimination System
FOIL	Freedom of Information Law	SSURGO	Soil Survey Geographic Database
GIS	geographic information system	SWPPP	Stormwater Pollution Prevention Plan
IRAC	Interdependent Radio Advisory Committee	USACOE	U.S. Army Corps of Engineers
kV	kilovolt	USDA	U.S. Department of Agriculture
kW	kilowatt	USFWS	U.S. Fish & Wildlife Service
LMR	land mobile radio	USGS	U.S. Geological Survey
MW	megawatt(s)	WCFZ	Worse Case Fresnel Zone
MWh	megawatt hours	WECS	Wind Energy Conversion System
NAAQS	National Ambient Air Quality Standards	WMA	Wildlife Management Area
NHPA	National Historic Preservation Act		
NRCS	Natural Resources Conservation Service		
NRHP	National Register of Historic Places		
NTIA	National Telecommunication and Information Administration		
NWI	National Wetlands Inventory		

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1.0 EXECUTIVE SUMMARY

This Draft Environmental Impact Statement (DEIS) has been prepared for a proposed action known as the Horse Creek Wind Farm (Project). Provided below is a brief Project description, along with summaries of the regulatory process; the Project's purpose, need and benefits; its potential environmental impacts; and proposed mitigation measures. Finally, as required by the State Environmental Quality Review Act (SEQRA), an introduction to the alternatives considered for the Project and the potential impacts on energy use and the Project's impact on climate change are presented.

Project Description

Atlantic Wind, LLC (Atlantic Wind/Project sponsor), a wholly-owned subsidiary of Iberdrola Renewables, Inc., is proposing to develop an up to 96 megawatt (MW) wind-powered generating facility on 9,450 acres of leased private land in the Town of Clayton, Jefferson County New York. The Project is anticipated to include up to 48 wind turbines manufactured by Gamesa, each with a generating capacity of 2.0 MW. The maximum proposed height of the wind turbines is 476 feet. The proposed turbine locations are located a minimum of 500 feet from existing roads and 1,250 feet from off-site residential structures, as required by local zoning, except where the affected property owner has provided written consent for a reduced setback. One permanent meteorological tower will also be installed, along with an operations and maintenance (O&M) facility, a system of gravel access road, buried and overhead electrical collection or gathering lines (electrical interconnect), a collector voltage step-up substation and an interconnection switching station adjacent to the existing National Grid Lyme Tap (Perch Lake) – Lyme (Rockledge) 115 kV transmission line. .

The Project will be constructed in one continuous phase anticipated to commence in the spring of 2013 and be completed in December 2013, pending receipt of all required permits and approvals. Site restoration may also occur in the spring following completion of construction. Once built, the wind turbines and associated components will operate in almost completely automated fashion. The Project will, however, employ approximately eight to eleven operations and maintenance personnel. Each wind turbine has a computer to control critical functions, monitor wind conditions, and report data.

SEQRA Overview

The Town of Clayton Planning Board is the Lead Agency pursuant to SEQRA (6 NYCRR Part 617). The Town of Clayton Planning Board has required the preparation of this DEIS. The DEIS is

intended to facilitate the environmental review process and provide a basis for informed public comment and decision-making.

Project design is based upon site developability, landowner participation, a wind resource assessment, environmental resource factors, and review of the site's zoning constraints. Various plans and support studies have also been prepared in support of the Project, which provide detailed information on discrete topical areas in furtherance of the SEQRA evaluation. These studies include the following:

- Preliminary Karst Condition Assessment
- Preliminary Subsurface Investigation and Geotechnical Evaluation
- Preliminary Geotechnical Engineering Assessment
- Draft Storm Water Pollution Prevention Plan
- Agricultural Protection Measures
- Wetland Delineation Report
- Phase IA Cultural Resources Investigation
- Shadow Flicker Assessment
- Transportation Route Evaluation and Structures Inventory
- Off-Air Television Reception Analysis
- Licensed Microwave Search & Worst Case Fresnel Zone Study
- Phase I Avian Risk Assessment
- Spring and Fall 2005 Radar and Acoustic Surveys of Birds and Bats
- Summer 2005 Breeding Bird Surveys
- 2006 Rare Bird Survey
- 2007 Breeding Bird and Rare Bird Survey
- 2008 Raptor Survey
- Summer 2006 Indiana Bat Survey
- Visual Impact Analysis
- Noise Analysis

Atlantic Wind commenced the initial SEQRA review of the Project in 2005, with the submittal of a local application that contemplated a 62-turbine wind powered electric generating facility producing up to 130 MW. Atlantic Wind prepared a Draft Generic Environmental Impact Study (DGEIS), which was deemed complete by the Town of Clayton on February 22, 2007 and was subsequently released for public review. Atlantic Wind placed the Project application on hold and as a result, the

application expired with the Town. As presently envisioned, the Project consists of a 48-turbine wind powered electric generating facility capable of producing up to 96 MW. As described in Sections 2.5 Project Siting Criteria and 5.0 Alternatives Analysis, the site planning and development process involves the evaluation of numerous project turbine site and layout iterations. In order to determine the preferred project configuration, various studies are conducted to determine which project alternatives result in the best balance between project benefits and adverse impacts. As a result, various studies are prepared that evaluate either a range of alternatives, or an alternative that considers a maximum number of turbine locations. In many of the studies conducted between 2005 and 2008, a larger project alternative was evaluated than the presently proposed preferred alternative. The environmental studies that were conducted which evaluated an alternative project are still relevant and included in this DEIS, even though they included a larger project. The results of these studies are applicable for evaluating and quantifying overall project benefits and potential adverse impacts. As a result of the process conducted to assess alternatives and develop the best practicable project, wind turbine numbering references are not sequential. For example, turbine number references range between 1 and 55, although only 48 turbines are presently proposed. Retention of the turbine numbering references allows for appropriate documentation of the alternative turbine locations that were considered, and ultimately remain a part of the Project or become removed.

Purpose, Need, and Benefit

The purpose of the Project is to:

- Create an economically viable wind-powered electric-generating facility;
- Provide renewable energy to the New York market at a competitive, low-cost price;
- Take maximum advantage of the unique wind resource within the Project area;
- Assist New York State in meeting its proposed Renewable Portfolio Standard goals for the generation of renewable energy in the State;
- Assist New York State in meeting the goals of the State Energy Plan and combating climate change;
- Promote the long-term economic viability of the host community located in a rural area of Upstate New York;
- Reduce the use and price volatility of fossil-fuel electricity generation in the region;
- Increase the amount of “in-state” electricity generated to lower New York’s dependence on imported energy from other states and foreign nations;
- Satisfy regional energy needs in an efficient and environmentally sound manner;

- Develop a wind powered electric-generation facility consistent with environmental and cultural requirements and community goals; and
- Create jobs and create revenue through PILOT payments to local taxing jurisdictions.

The need for the Project is well established in both State and Federal policy promoting wind powered electric generating facilities. The Project assists the State in meeting these policy objectives (including the State Energy Plan, Renewable Portfolio Standard targets and other Executive Orders) while minimizing potential environmental impacts and impacts of local concern typically associated with wind-powered electric generating facility siting, including visual and noise impacts, and development in New York State. In addition, the benefits of the proposed action include positive impacts on socioeconomics (e.g., payment-in-lieu of tax [PILOT] revenues to local municipalities and lease revenues to participating landowners), air quality (through reduction of emissions from fossil-fuel-burning power plants), and climate (reduction of greenhouse gases that contribute to global warming).

Summary of Potential Impacts

In accordance with requirements of the SEQRA process, potential impacts arising from the proposed Project were evaluated with respect to environmental and cultural resources. The analysis of potential impacts is summarized below.

Environmental Factor	Potential Impacts
Physiography, Geology, and Soils	Soil disturbance Soil erosion Soil compaction Loss of agricultural land
Water Resources	Temporary disturbance Siltation/sedimentation Stream crossings Wetland filling
Biological Resources	Vegetation clearing/disturbance Incidental wildlife injury and mortality Impacts to threatened or endangered species Loss or alteration of habitat
Climate and Air Quality	Construction vehicle emissions Dust during construction Reduced air pollutants and greenhouse gases
Aesthetic/Visual Resources	Visual change to the landscape Visual impact on sensitive sites/viewers Shadow-flicker impact on adjacent residents

Environmental Factor	Potential Impacts
Cultural Resources	Visual impacts on architectural resources Disturbance of archaeological resources
Sound	Construction noise Operational impacts on adjacent residents
Transportation	Road wear/damage Traffic congestion/delays Road system improvements/upgrades
Socioeconomic	Host communities payment/PILOT Revenue to participating landowners Expenditures on goods and services Tourism Short-term and long-term employment
Public Safety	Construction concerns related to large equipment, falling objects, open excavations, electrocution Possible ice shedding concerns
Communication Facilities	Temporary interference to communication signals Degraded reception to off-air television signals
Community Facilities and Services	Demands on police and emergency services
Land Use and Zoning	Adverse and beneficial impacts on farming Changes in community character and land use trends

Construction of the Project will result in total (temporary and permanent) disturbance of up to 467.5 acres of soil and 498.5 acres of vegetation, most of which is in agricultural fields. These acreages include, approximately 48.5 acres of forest and 5 acres of wetland that could be disturbed by Project construction. However, most of this disturbance will be temporary. A total of approximately 34.5 acres of agricultural land will be converted to non-agricultural use/built facilities (e.g., roads, turbines, substation, etc.), and a total of approximately 3 acres of forest will be converted to built facilities. Permanent wetland impacts are estimated to be approximately 0.5 acre with an additional 0.5 acre of conversion of forested wetlands to other wetland community types. Project construction will also result in some level of temporary disturbance and area roadway impacts.

Project operation is expected to result in some level of avian and bat collision mortality, including the potential for impacts to threatened or endangered species. Based on data from operating wind farms in New York, bird mortality is expected to be in the range of 1.1 to 5.8 birds per installed MW per year, while bat mortality is expected to be in the range of 0.5 to 15.0 bats per installed MW per year.

The turbines will be visible from many locations within the surrounding area, but will also be fully or partially screened from viewers in many locations. The turbines will result in a perceived change in land use from some locations, but may actually help keep land in active agricultural use by supplementing farmers' income.

Predicted noise and shadow flicker impacts have been assessed and determined to be modest. Only five receptors have the potential to experience over 30 hours of shadow flicker annually, and turbine-related sound is not predicted to exceed 50 decibels at adjacent residences.

The Project is expected to generate approximately \$768,000 per year (more than \$15 million over the life of the Project) in PILOT revenues 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. General mitigation measures will include adhering to requirements of various local, state, and federal ordinances and regulations. Atlantic Wind will also employ environmental monitors to assure compliance with permit requirements and environmental protection commitments during construction. The proposed Project will result in significant environmental and economic benefits to the area. These benefits also serve to mitigate unavoidable adverse impacts associated with Project construction and operation.

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

- Siting the Project away from population centers and areas of residential development.
- Siting turbines primarily in open field areas to minimize required clearing of mature forestland to the extent practicable.
- Siting turbines and access roads so as to avoid impacts to wetlands and streams.
- Continued consultation with New York State Department of Environmental Conservation (NYSDEC) and U.S. Fish and Wildlife Service (USFWS) to develop siting and operational measures to minimize or avoid impacts to wildlife including threatened and endangered species to the maximum extent practicable.

- Keeping turbines a minimum of 1,250 feet from off-site residences to minimize noise, shadow flicker, and public safety concerns (unless the affected property owner provides written consent for a reduced setback).
- Using existing farm/logging roads or other level areas for turbine access whenever possible to minimize disturbance to agricultural land.
- Utilizing construction techniques that minimize disturbance to vegetation, streams, and wetlands including restricted use areas (e.g. in appropriate areas use of low pressure vehicles, no vehicle access areas, no herbicide application areas, minimal clearing requirements etc.).
- Continuing consultation with New York State Department of Agriculture and Markets (NYS&M) representatives and 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.
- Developing and implementing various plans to minimize adverse impacts to air, soil, and water resources, including a dust control plan, sediment and erosion control plan, and Spill Prevention, Control, and Countermeasure plan.
- 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 over the first 20 years of the Project's operations.
- Development of an emergency response plan with local first responders.

Alternatives

Alternatives to the proposed Project that were considered and evaluated include no action, alternative project siting, alternative project design/layout, alternative construction phasing, and alternative technologies. Three alternative project designs were compared, 1) the preferred alternative (48 turbines); 2) a larger project site (62 turbines); and 3) a fewer turbine alternative (25 turbines). Analysis of these alternatives revealed that both the size of the Project and the configuration of the turbines as currently proposed are necessary to produce a commercially feasible project that minimizes adverse impacts to the extent practicable. A smaller project would not fully capture the available wind resource and would not generate enough power to be economically viable given the project development and construction costs, including the expense of connecting to the power grid. A significantly larger facility within the same Project area might theoretically provide more economic return, but it would force location of towers into areas with more marginal wind

power resources and greater proximity to residents, shallow bedrock, and/or forested areas. This would result in more numerous potential adverse environmental impacts than currently anticipated. A larger number of smaller turbines, while perhaps reducing visibility from some areas, would not change the overall visual impact of the Project and would increase impacts associated with the more extensive road and interconnect systems required. Alternative technologies (e.g., different sources of generation) eliminate many of the environmental advantages associated with the proposed Project. In summary, the alternatives analysis concluded that the Project as proposed offers the optimum use of resources with the fewest potential adverse impacts.

Effects on Use and Conservation of Energy Resource

Although the Project uses energy resources during construction, the operating Project will have significant, long-term beneficial effects on the use and conservation of energy resources and combating global climate change. Energy will be expended during the construction phases of the Project (transportation/mobilization), as well as for the maintenance of the wind turbines and support facilities within the Project area. However, the operating Project will generate up to 96 MW of electricity without any fossil-fuel emissions. This greatly exceeds the energy required to construct and operate the Project, and the output is enough to power between 22,500-35,000 homes in New York State (on an average annual basis).

The Project will add to and diversify the state's sources of power generation, accommodate growing 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. Wind energy is a preferred power source on an economic basis because the operating costs to run the turbines are so 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).

Finally, 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 energy costs 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.

Based on the State Energy Plan, other public benefits of the Project related to energy use include the following:

- Production and use of in-state energy resources can increase the reliability and security of energy systems, reduce energy costs, and contribute to meeting climate change and environmental objectives.
- To the extent that renewable resources and natural gas are able to displace the use of higher emitting fossil fuels, relying more heavily on these in-state resources will also reduce public health and environmental risks posed by all sectors that produce and use energy.
- By focusing energy investments on in-state opportunities, New York can reduce the amount of dollars “exported” out of the State to pay for energy resources.
- By re-directing those dollars back into the State economy, New York can start to increase its economic competitiveness with other states that are less dependent on energy supply imports to support their local economies.
- Increasing the percentage of energy derived from renewable resources will reduce the net retail price of electricity for all customers.
- Renewable energy contributes to the reduction of energy price volatility in the long-term.

2.0 INTRODUCTION

This DEIS has been prepared for the proposed action and Project which consists of the construction and operation of up to 48 wind turbine generators and associated facilities, capable of producing and delivering up to 96 MW of electrical power to the New York State Power Grid.

The Town of Clayton Planning Board is the Lead Agency pursuant to SEQRA and its implementing regulations (6 NYCRR Part 617). The Town of Clayton Planning Board has required the preparation of this DEIS in order to evaluate the potential environmental, social and economic impacts of the Project, which is located in a 9,450-acre area (Project site or Project area) within the Town of Clayton, Jefferson County, New York. The purpose of this DEIS is to evaluate the potential adverse environmental impacts of the Project, evaluate alternatives and consider mitigation measures.

The proposed Project is described below in terms of its components, potential location, construction, and operation. The Project's purpose, need, and benefit; cost and funding; permits and approvals are also discussed below, along with a description of the regulatory process and opportunities for public and agency involvement in that process.

2.1 DESCRIPTION OF PROPOSED ACTION

Atlantic Wind, LLC, a wholly-owned subsidiary of Iberdrola Renewables, Inc. (Iberdrola), is proposing to develop an approximately 96 MW wind-powered generating facility in the Town of Clayton, Jefferson County New York (Figure 1). The Project is anticipated to include approximately 48 wind turbines, each with a generating capacity of 2.0 MW. As presently envisioned, the Project will consist of a maximum of 48 wind turbines, currently anticipated to be manufactured by Gamesa (G90 and/or G97, 2.0 MW models), or equivalent machines. The G90 model consists of a 100-meter (328-foot) tall tubular steel tower; a 90 meter (295-foot) diameter rotor consisting of three 44-meter (144-foot) long composite blades; and a nacelle which houses the generator, gearbox, and power train. With a rotor blade oriented vertically, each G90 turbine has a maximum height of 145 meters (476 feet) (including the concrete pedestal). The G97 model consists of a 90-meter (295-foot) tall tubular steel tower; a 97 meter (318-foot) diameter rotor consisting of three 48-meter (157-foot) long composite blades; and a nacelle which houses the generator, gearbox, and power train. With a rotor blade oriented vertically, each G97 turbine has a maximum height of 139 meters (456 feet) (including the concrete pedestal). It is noted that regardless of the wind turbine make and model used for the Project, the maximum total height will not exceed 500 feet as specified in the

Town of Clayton Wind Energy Facility Law, §12(M). One permanent meteorological towers will also be installed, along with an O&M facility, a system of gravel access roads, buried and overhead electrical collection or gathering lines (electrical interconnect), a collector voltage step-up substation and an interconnection switching station adjacent to the existing Lyme Tap (Perch Lake) – Lyme (Rockledge) 115 kV transmission line. .

The layout, location, and number of turbines presented in this DEIS have been sited to optimize the benefits of local wind conditions while either avoiding or minimizing adverse environmental impacts. Furthermore, the layout, location, and number of turbines are meant to assure that the Project is commercially viable. All potential turbine sites are located a minimum of 500 feet from existing roads and at least 1,250 feet from off-site neighboring residential structures, unless the affected property owner provides written consent for a reduced setback. Because of ongoing agency consultation/input, environmental considerations, landowner decisions, and potential unforeseen construction issues, all of the potential turbine locations are still subject to minor adjustments. However, this DEIS provides a basis for future decision-making that will assure that any such adjustments will, consistent with SEQRA, avoid or minimize adverse impacts to the maximum extent practicable pursuant to thresholds and criteria established by the Lead Agency.

2.2 PROJECT PURPOSE, NEED AND BENEFIT

The purpose of the Project is to:

- Create an economically viable wind-powered electric-generating facility;
- Provide renewable energy to the New York market at a competitive, low-cost price;
- Take maximum advantage of the unique wind resource within the Project area;
- Assist New York State in meeting its proposed Renewable Portfolio Standard goals for the generation of renewable energy in the State;
- Assist New York State in meeting the goals of the State Energy Plan and combating climate change;
- Promote the long-term economic viability of the host community located in a rural area of Upstate New York;
- Reduce the use and price volatility of fossil-fuel electricity generation in the region;
- Increase the amount of “in-state” electricity generated to lower New York’s dependence on imported energy from other states and foreign nations;
- Satisfy regional energy needs in an efficient and environmentally sound manner;
- Develop a wind powered electric-generation facility consistent with environmental and cultural requirements and community goals; and

- Create jobs and create revenue through PILOT payments to local taxing jurisdictions.

The need for the Project is well established in both State and Federal policy promoting wind powered electric generating facilities. The Project assists the State in meeting these policy objectives (including the State Energy Plan, Renewable Portfolio Standard targets and other Executive Orders) while minimizing potential environmental impacts and impacts of local concern typically associated with wind-powered electric generating facility siting, including visual and noise impacts, and development in New York State. In addition, the benefits of the proposed action include positive impacts on socioeconomics (e.g., PILOT revenues to local municipalities and lease revenues to participating landowners), air quality (through reduction of emissions from fossil-fuel-burning power plants), and climate (reduction of greenhouse gases that contribute to global warming).

The Project is consistent with the goals of, and will specifically help facilitate compliance with, the following state and federal initiatives:

New York State Energy Plan

The New York State Energy Plan (released in December 2009) establishes a list of objectives for State Energy Policy, which include: 1) maintaining electricity system reliability; 2) supporting energy systems that enable the State to significantly reduce greenhouse gas emissions; 3) stabilizing energy costs and improving economic competitiveness; 4) reducing health and environmental risks associated with the production and use of energy, and; 5) improving the State's energy interdependence and fuel diversity by developing in-state energy supply resources.

The Project will contribute to New York achieving each of these objectives as set forth in the New York State Energy Plan. As a utility-scale wind project, the Project will help New York achieve the goal of a reliable energy system by diversifying the State's generation mix. The Project proposes to add a nameplate capacity of 96 MW of wind-powered electricity to the State's electrical grid. As such, the Project will play a significant role in diversifying the State's energy mix. Moreover, a diversified fuel mix is likely to lead to less volatile electricity prices and therefore lower rates for consumers. The diversification of the fuel mix also has the benefit of increasing New York's energy security.

In addition, the Project will result in significant reductions in greenhouse gas emissions compared with the use of fossil fuels for electricity generation. The Project, utilizing the wind rather than a carbon based energy source, will have a positive effect in reducing greenhouse gas and dangerous

contaminant emissions thereby reducing public health and environmental risks. The Project will assist in increasing New York State-based energy generation. Finally, as well as being an in-state source of renewable energy, the Project will also provide benefits to the State and local economy through, among other ways, a PILOT agreement totaling approximately \$768,000 annually.

Executive Order No. 24

Many New York State policies have recognized that global climate change is one of the most important environmental challenges of our time. There is scientific consensus that human activity is increasing the concentration of greenhouse gases in the atmosphere and that this, in turn, is leading to serious climate change. By its nature, climate change will continue to affect the environment and natural resources of the State of New York. In response, Governor Paterson's Executive Order 24 establishes a goal to reduce greenhouse gas emissions 80 percent by the year 2050, and includes a goal to meet 45 percent of New York's electricity needs through improved energy efficiency and clean renewable energy by 2015. Emissions of CO₂ account for an estimated 88 percent of the total annual greenhouse gas emissions in New York State. The overwhelming majority of these emissions, estimated at 250 million tons of CO₂ equivalent per year, result from fuel combustion. Overall, fuel combustion accounts for approximately 88.3 percent of total greenhouse gas emissions. The Project promotes consistency with a policy of reducing greenhouse gas emissions.

Executive Order No. 24 also led to the formation of the State's Climate Action Council which issued an interim report in November 2010 setting forth an "action plan" to combat climate change. The interim plan relies on the development of renewable energy sources, such as wind, in order to reduce greenhouse gas emissions while continuing to ensure the reliable future supply of electricity and energy for New York. The plan is intended to serve as a policy "road map" to address the many challenges New York faces in reducing its dependence on fossil fuels, stimulating investment in clean energy alternatives, increase the availability of in-state sources of energy and moving toward a Clean Energy Economy in New York State. New York State has the most wind energy development potential in the Northeast and the mid-Atlantic region. This potential could allow the State to move toward an innovative, clean energy economy, which would put New York State at the forefront of the transition towards a more environmentally sustainable energy future. The Project will assist New York in meeting this goal.

New York State Renewable Portfolio Standard

Originally, the New York State Public Service Commission (PSC) "Order Approving Renewable Portfolio Standard Policy" called for an increase in renewable energy used in the state to increase to 25 percent by the year 2013. According to the NYS Renewable Portfolio Standard (RPS) 2008

Performance Report, renewable energy production only reached 25 percent of its annual target in 2007 and it is projected to reach 75 percent of the 2008 main tier target. At this rate, it is unlikely that New York will meet the targets set forth in the RPS. PSC Staff have recently noted that “it is in the public interest to expand renewable energy investments in New York” and that the Main Tier of the RPS (the tier in which the Project would fall), “provides significant environmental benefits, does not result in large rate increase, improves generation resource diversity, provides a number of difficult to quantify benefits, and has a potential to act as a hedge against wholesale electricity price swings.” Recognizing the need for increased renewable energy generation sources, the PSC recently increased the targets of the RPS to increase the proportion of renewable generation to 30 percent by 2015.

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.”

In addition to assisting the achievement of many State and Federal policies, the Project will also promote a number of environmental, public health and both state-wide and local economic benefits:

- Environmental benefits:
 - Wind-generated electricity 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 (tied to global climate change). NYSERDA found that if wind energy supplied 10 percent (3,300 MW) of the state’s peak electricity demand, 65 percent of the energy it displaced would come from natural gas, 15 percent from coal, and 10 percent 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).

- The precipitation on the Tug Hill plateau is among the most acidic of any place in the US, one effect of which could be damage to local stands of sugar maple trees due to [possible interference with their uptake of nutrients] (Allan, D. et al., 1995).
 - Energy efficiencies and renewable energy generation together will reduce New York's greenhouse gas emission, helping to achieve the State's CO₂ reduction goals (NYSERDA, 2007).
 - 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).
 - Lower emissions of SO₂ and NO_x could also produce healthier rainwater for crops, and less pollution in sensitive ecosystems like the Adirondack area. The RPS started in January 2006 and according to the PSC, should reduce statewide air emissions of nitrogen oxide (NO_x) by 6.8 percent, sulfur dioxide (SO₂) by 5.9 percent, and carbon dioxide (CO₂) by 7.7 percent (PSC, 2004). By offsetting the emission of key air pollutants and greenhouse gases, the Project will clearly benefit local ecosystems, water resources as well as human health. Additional information on the air quality benefits of the proposed Project is included in Sections 3.9 and 3.4.
- Statewide economic benefits:
 - New York is the fourth largest energy user in the United States, yet only 10 percent of its requirements come from in-state resources. New Yorker's spent more than \$57 billion for energy in 2005 and 90 percent of that was imported from outside New York (NYSERDA, 2007). The Project will ensure that more of the State's energy needs are provided from an in-State resource consistent with the State Energy Plan, as discussed above.
 - Reduction in the use of natural gas at New York State power plants will reduce the demand for and the cost of natural gas, creating benefits for both electric ratepayers

and natural gas consumers (ACENY, 2008). In addition, as a result of the RPS, and the displacement of natural gas use described above, the PSC anticipates that wholesale energy prices are likely to decline as the addition of substantial amounts of renewable energy offsets some of the program costs. The cumulative direct cost of RPS-related payments to renewable energy projects, expected to be in the range of \$582 million to \$762 million, is expected to be partly offset by approximately \$362 million in wholesale energy cost reductions as New York reduces its reliance upon fossil fuels (PSC, 2004).

- Human health benefits:
 - 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 NYSDEC has issued advisories pertaining to fish consumption. Eighty-seven (87) of the 136 bodies of water with health advisories in New York State are listed in part or wholly because of mercury contamination. 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 water bodies listed by the NYSDEC (NYSDOH, 2007).
 - 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).
 - Some of the ecosystems in upstate and northern New York are especially at risk from the combustion of fossil fuels. Airborne mercury released by coal combustion has contaminated most lakes in New York State to the extent that the NYSDEC now prohibits the eating of fish caught in those bodies of water (NYSDOH, 2007).
 - Lower emissions of SO₂ and NO_x could also produce healthier rainwater on crops, and less pollution in sensitive ecosystems like the Adirondack area. The RPS started in January 2006 and according to the PSC, should reduce statewide air emissions of nitrogen oxide (NO_x) by 6.8 percent, sulfur dioxide (SO₂) by 5.9

percent, and carbon dioxide (CO₂) by 7.7 percent (PSC, 2004). By offsetting the emission of key air pollutants and greenhouse gases, the Project will clearly benefit local ecosystems, water resources as well as human health. Additional information on the air quality benefits of the proposed Project is included in Sections 3.9 and 3.4.

- Local socioeconomic benefits:
 - Increased revenues to local municipalities.
 - Short-term employment of construction workers, and long-term employment of operating workers (Ouderkirk & Pedden, 2004).
 - Direct lease payments to participating landowners.
 - "Direct economic effects" in the form of immediate payments to consultants, contractors, and the labor pool required to develop, build, and operate the Project (Ouderkirk & Pedden, 2004).
 - "Induced effects" in the form of everyday purchases made by the firms and employees working at the Project site (i.e., groceries, gas and supplies, hotel accommodations, patronization of various local establishments, etc.) (Ouderkirk & Pedden, 2004).

2.3 PROJECT COST AND FUNDING

The \$230 million cost of developing, permitting and constructing the Project will be provided by Iberdrola, which has developed several other wind power projects in the United States, including the constructed Maple Ridge Wind Farm on the Tug Hill Plateau in Lewis County, New York. This 322 MW project, which includes 195 operating wind turbines in the towns of Martinsburg, Harrisburg and Lowville, is jointly owned by Iberdrola (formerly PPM Energy) and Horizon Wind Energy (formerly Zilkha Renewable). The Horse Creek Wind Power Project will also be funded as a commercial, for-profit enterprise with the approximately \$230 million capital cost to be provided by Iberdrola, which may also elect to finance this expenditure through commercial debt and/or other private investors. Iberdrola intends to own and operate the Project, through a wholly owned subsidiary Atlantic Wind LLC, a standalone special purpose entity (an ownership structure that is typical for the independent or non-utility industry). The electrical output will likely be sold in the New York State Independent Service Operator (NYISO) wholesale power market or to other power buyers under bilateral power purchase agreements; and the "green tags" or renewable energy credits will likely be sold separately either to NYSERDA, under the RPS program, or to other buyers of clean power.

2.4 GENERAL PROJECT LOCATION

The Project is located on approximately 9,450 acres of private land in the northwestern portion of Jefferson County, northeast of Lake Ontario at Chaumont Bay and southeast of the St. Lawrence River. Located in the southeastern portions of the Town of Clayton, the Project is approximately five miles south-southeast of the Village of Clayton and three miles northeast of the Village of Chaumont. The Project boundary abuts the town boundaries of Brownville and Lyme between Perch Lake and the Chaumont River (See Figure 2).

The Project site is located in the nearly level lake plain of the Lake Ontario/St. Lawrence Seaway. The majority of the area consists of open crop fields (primarily hay and soybeans), reverting fields and pastures, with forested areas generally confined to small woodlots. The Project area also includes successional old-field, hedgerow, successional shrubland, residential yards, farms, streams, and wetlands. Existing built features within the Project boundaries include roads, single-family homes, seasonal homes, barns, silos, and other agricultural buildings.

2.4.1 Project Lease/Easement Terms and Conditions

The Project sponsor will offer all participating landowners within the Project area (landowners who consent to Project components occupying their land), a standard form lease agreement (for hosts of the wind towers) or easement (for hosts of access roads, power lines and related facilities), that provide for compensation during the Project's development, construction and operation. These leases and easements will secure all the land rights necessary to develop, construct and operate the wind turbine generators along with all ancillary facilities. These agreements include the following provisions:

- A term of 25 years with a 25 year extension (at the option of the Project sponsor),
- Lessee access rights as necessary to develop, build and operate the Project facilities,
- Quarterly rental payments for landowners hosting wind turbine towers, and one-time payments for easements (typically payable per foot of access road or power line),
- Standard indemnification provisions that protect the lessor-landowner from any damages related to the construction or operation of the Project facilities,
- A clean-up requirement of the lessee that obligates it to remove from the leased premises all refuse and other debris resulting from the development, construction or operation of the Project facilities, and to maintain the cleanliness of these premises,
- A decommissioning requirement that obligates the lessee (i.e. the Project sponsor) to remove all above-ground Project facilities at the end of the Project's useful life, and to return

the leased property to its original condition except for any facilities that are more than 36 inches below ground,

- Other commercial terms that are typical for long-term leases or easements in New York.

2.5 PROJECT SITING CRITERIA

The proposed location and spacing of the wind turbines and support facilities is preliminary based upon site developability, landowner participation, a wind resource assessment, environmental resource factors, and review of the site's zoning constraints. Factors considered during preliminary and final turbine and other Project component placement include the following:

Wind resource assessment: Through the use of modeling software, meteorological data, and topographic data, the wind turbines are sited to optimize exposure to wind from all directions, with emphasis on exposure to the prevailing wind direction in the Project area.

Sufficient spacing: Siting turbines too close to one another can result in decreased electricity production, and excessive turbine wear, due to the creation of wind turbulence between and among the turbines. Each operating wind turbine creates downwind turbulence in its wake. As the flow proceeds downwind, there is a spreading of the wake and recovery to free-stream wind conditions. The Project turbines will have a final placement with enough space between them to minimize wake losses and maximize the capture of wind energy.

Local Zoning: The Town of Clayton, pursuant to their Wind Energy Facilities Law have established a wind power overlay district, to provide an area within the Town of Clayton where wind energy facilities shall be permitted subject to the review and permitting requirements of their local ordinance. All wind turbines are located within this district. The Project complies with the terms and conditions of the town Wind Energy Facilities Law.

Distance from residences: The turbine locations will maintain a minimum setback of 1,250 feet between the tower and the nearest off-site residence, unless the affected property owner provides written consent for a reduced setback. Turbine setbacks will comply with the town of Clayton Wind Energy Facilities Law, and will minimize potential visual and sound effects of the turbines on Project neighbors.

Distance from Non-participating Land Parcels: The turbine locations will maintain a minimum setback of 500 feet from off-site property lines, in accordance with the town of Clayton Wind Energy Facilities Law.

Distance from roads: The turbine locations will also maintain a minimum setback of at least 500 feet from public roads, in accordance with the wind turbine siting requirements of the town of Clayton Wind Energy Facilities Law.

Distance from electric grid and other infrastructure: The Project will comply with the setback requirement established by the New York Public Service Commission, which is a 1.5 times setback from existing and proposed major transmission facilities operating at 115 kV or greater described in Case 07-E-0213.

Noise: Through adherence to required setback distances, turbine siting will comply with the town of Clayton Wind Energy Facilities Law noise standards for wind power projects. The standards indicate that the sound pressure level (L_{10}) due to any turbine operation shall not exceed 50 dBA when measured at any off-site residence, school, hospital, church or public library existing on the date of the “WECS application” unless the affected property owner provides written consent for the noise level to exceed this limit (§15.A of Town of Clayton Local Law No. 1 of 2007).

Wetlands and Waterbodies: The O&M Facility, temporary construction staging areas, substation and turbine foundations will not be located within delineated federal jurisdictional or state regulated freshwater wetlands. However, placement of interconnecting access roads, turbine workspaces, and electrical lines in wetlands may be unavoidable. These disturbances have been sited to minimize potential impacts.

Communication Interference: Turbines will be sited outside of known microwave pathways or Fresnel zones to minimize the effect that they may have on local communications.

Cultural Resources: All Project components will be sited and Project construction will be conducted in such a way that will avoid impacts to the maximum extent practicable. An Unanticipated Discoveries Plan will be implemented to further minimize the potential for adverse impacts to prehistoric or historic archeological resources, as recommended by the Project’s Cultural Resources Specialists.

Wildlife Habitat: Atlantic Wind will avoid critical wildlife habitat to the maximum extent practicable and work closely with the U.S. Fish and Wildlife Service, NYSDEC and other appropriate entities to minimize the effect the Project may have on critical habitats through minimization, avoidance and/or mitigation measures.

The individual components of the Project layout are described individually in the following sections.

2.5.1 Wind Turbines

Gamesa Eolica manufactures the wind turbines anticipated to be used for this Project. Additional information regarding these turbines is included in the manufacturer's product brochures in Appendix A. This type of wind turbine is selected because it is a state-of-the-art on-shore wind turbine, and because its performance and efficiency are most suited to the wind resource/wind conditions on site to maximize the generation of energy in the Project area. Because the Project is not scheduled to be built until 2013, market factors such as availability and cost could dictate use of an alternate turbine. However, any turbine ultimately selected will be similar in design and appearance to the Gamesa Eolica machine. Each wind turbine consists of three major components; the tower, the nacelle, and the rotor. The maximum height of the tower, or "hub height" (height from the base of the tower to the center of the rotor hub on top of tower) will be approximately 328 feet. The nacelle sits atop the tower, and the rotor hub is mounted on a drive shaft that is connected to the gearbox and generator contained within the nacelle. The maximum total turbine height (i.e., height at the highest blade tip position) will be approximately 476 feet. Descriptions of each of the turbine components are provided below.

Tower: The tubular towers used for this Project are conical steel structures manufactured in five sections, each of which are trucked separately to the site and bolted together using internal flanges. The towers have a base diameter of approximately 13.5 feet and a top diameter of approximately nine feet and are mounted on a concrete foundation (see Section 2.6.6). Each tower will have an access door, internal lighting, and an internal ladder to access the nacelle. The towers will be painted white to make the structure less visually obtrusive.

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 by 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, and is approximately 28 feet long, 10 feet tall, and 11 feet wide. It is externally equipped with an anemometer and a wind vane that measure wind speed and direction (information used by the turbine controller to turn the machine on and off, and to yaw it into correct position). Attached to the top of some of the nacelles, per specifications of the Federal Aviation Administration (FAA), will be a single, medium intensity aviation warning light. These will be red flashing red lights (L-864) and operated only at night. The nacelle is mounted on a sliding ring that allows it to rotate or “yaw” into the wind to maximize energy capture.

Rotor: A rotor assembly is mounted on the drive shaft, and is operated upwind of the tower. Each rotor consists of three fiberglass composite blades a maximum of 157 feet in length (total rotor diameter of 318 feet). The rotor attaches to the drive shaft at the front of the nacelle. Electric servo motors within the rotor hub vary the pitch of each blade according to wind conditions, which enable the turbine to operate efficiently at varying wind speeds. The wind turbines begin generating energy at wind speeds as low as 3 meters per second (m/s) (6.7 mph) and automatically shut down at wind speeds above 25 m/s (56 mph). The maximum rotor speed is approximately 19 revolutions per minute (rpm).

2.5.2 Electrical System

The proposed Project is anticipated to have an electrical system that consists of the following parts: 1) a system of buried 34.5 kV shielded and insulated cables that will collect power from each wind turbine (electrical collection lines), 2) overhead 34.5 kV collector lines that will transmit larger amounts of power from the underground collector circuits to the collector substation, 3) a collector substation that will convert the generated electricity from the 34.5 kV voltage level to 115 kV which matches the voltage of the nearby transmission system, and 4) a switching station located south of County Road 126 and east of County Route 54 in the southern section of the Project site, that interconnects the project and delivers energy to the existing 115 kV transmission line and regional power grid. Each of these components is described below.

Electrical Collection Line System: A transformer located in the interior of the nacelle, will raise the voltage of electricity produced by the turbine generator up to the 34.5 kV voltage level of the collection system. From the transformer, three power cables along with the fiber optic communication cables will collect the electricity produced by a group of wind turbine generators. These power lines will be underground, and typically will be installed adjacent to Project access roads, with each circuit connecting a set of turbines to the overhead collector

lines. The general locations of proposed underground and overhead collection lines are indicated in Figure 3. The total length of buried interconnect will be approximately 16.1 miles and the total length of overhead interconnect carrying electricity to the collection station will be approximately 5.5 miles.

Collector Substation: The collector substation will be located south of County Road 126 and east of County Road 54 in the southern section of the Project site. It is the terminus of the collection system, and will transform the voltage of this system from 34.5 kV to 115 kV. The fence line of the station will be approximately 100 by 200 feet in size and will include 34.5 and 115 kV busses, a transformer, circuit breakers, towers, a control enclosure, and related structures. The collector substation will be enclosed by chain link fencing and will be accessed by a new gravel access road 16 feet in width.

Interconnection Switching Station: An interconnection switching station, to be owned and operated by National Grid, will be located adjacent to the collector substation. It provides the facilities necessary to reliably interconnect the project to the existing 115 kV transmission line and regional power grid. The fence line of the station will be approximately 250 by 300 feet in size and will include 115 kV busses, circuit breakers, towers, a control enclosure, and related structures. The interconnection switching station will be enclosed by chain link fencing and will be accessed by a new gravel access road 16 feet in width.

2.5.3 Access Roads

The Project will require the construction of new or improved access roads to provide access to the proposed turbines, collector substation, interconnection switching station, and O&M facility sites. The proposed location of Project access roads is shown in Figure 3. The total length of access road required to service all proposed wind turbine locations is approximately 13.6 miles, some which will be upgrades to existing farm lanes. The temporary construction roads will be gravel-surfaced and typically are 50 feet in width (with a temporary disturbance up to 100-foot wide). The permanent roads will be gravel-surfaced and typically are 16 feet in width (however, for impact calculation purposes a maximum finished width of approximately 20 feet is assumed). See Appendix A for typical access road specifications.

2.5.4 Wind Measurement Tower

One 100-meter (328-foot) tall wind measurement tower (meteorological tower) will be installed to collect wind data and support performance testing of the Project. The tower will be a self-supporting

galvanized tubular or lattice steel structure, and will be equipped with wind velocity and directional measuring instruments at three or more different elevations. As presently planned, the meteorological tower is located in the southern portion of the project area, northwest of the CR 54/Morris Tract Road intersection, near turbines 5 and 6 (See Figure 3).

2.5.5 Staging Area

Construction of the Project will require the development of up to three construction staging areas, which will accommodate construction trailers, storage containers, large Project components, and parking for construction workers. The additional staging may be required for the operation of a batch plant and the storage of component deliveries. The staging area(s) is anticipated to occupy approximately up to a maximum of 35 acres, and will be centrally located on agricultural land (cropland or pasture). The final location of the staging area(s) is undetermined, however three potential sites have been identified (see Figure 3). No fencing or lighting of the staging area is proposed. The staging area(s) is temporary for use during construction of the Project. The areas used for this purpose will be restored to pre-Project conditions following completion of all project construction activities.

2.5.6 Operations and Maintenance Facility

An operations and maintenance facility (O&M) will include a storage yard adjacent to the O&M building that will house equipment and materials necessary to service the Project. The O&M facility will be located on a leased parcel of land, approximately five acres in size. Currently, the sites of potential staging areas are anticipated to serve as the future O&M facility site. It will consist of a single story building up to 6,000 square feet in size, a fenced area for outdoor equipment and material storage, and a parking area for staff and visitors.

2.6 PROJECT CONSTRUCTION

Project construction is anticipated to occur in a single phase. Pending the receipt of all appropriate permits, construction anticipated to commence in the spring of 2013 and be completed by December 31 of that year. Site restoration will occur during project construction, as appropriate, and in the spring following completion of construction activities. Although a detailed schedule has not yet been developed, Project construction is anticipated to proceed in the following order: a) civil work (e.g., public road improvements, access roads construction, turbine foundation construction); b) electrical work (e.g., installation of buried and overhead collector lines and construction of the Project substation and interconnection switching station); c) wind turbine installation; d) Project testing and commissioning; and e) site restoration.

Project construction will be performed in several stages and will include the following main elements and activities:

- Grading of the staging/field construction office area and substation areas
- Construction of access roads, crane pads, and turn-around areas (turbine workspaces)
- Construction of turbine tower foundations
- Installation of the underground and overhead electrical collection systems
- Assembly and erection of the wind turbines
- Construction and installation of the substation
- Plant commissioning and energization
- Site restoration

Prior to the initiation of construction, various environmental protection and control plans will be developed and shared with the Town. These will include a final construction routing plan, road improvement plan, emergency response plan, public safety plan, and complaint resolution procedures. These and other plans and procedures are described in greater detail in Section 3 of the DEIS. Actions included in these plans and procedures will be reviewed, coordinated and approved by the town prior to implementation, to assure that the impacts of Project construction on local residents are avoided, minimized, or mitigated to the extent practicable. The following section describes the various activities that will occur as part of Project construction. Representative photographs of wind power project construction activities are included in Figure 4. Typical construction dimensions are included in Appendix A.

2.6.1 Pre-construction Activities

Before construction commences, a site survey will be performed to stake out the exact location of the wind turbines, access roads, electrical lines, and substation areas. Once the surveys are complete, a detailed geotechnical investigation will be performed to identify subsurface conditions and allow development of final design specifications for the access roads, foundations, underground trenching, overhead lines, substations and electrical grounding systems. The geotechnical investigation involves a drill rig obtaining borings to identify the subsurface soil and rock types and strength properties. Testing is also done to measure the soil's electrical properties to ensure proper grounding system design. A geotechnical investigation is generally performed at some or all turbine locations, at the substation location, along the access roads, and at the O&M facility site.

Using all of the data gathered for the Project (including geotechnical information, environmental conditions, site topography, etc.), the Project sponsor will develop a set of site-specific construction specifications for the various components of the Project. The design specifications will comply with construction standards established by various industry practice groups such as:

- American Concrete Institute (ACI)
- Institute for Electrical and Electronic Engineers (IEEE)
- National Electric Code (NEC)
- National Fire Protection Agency (NFPA)
- Construction Standards Institute (CSI)

The Project engineering team will ensure that all aspects of the specifications, as well as the actual on-site construction, comply with all applicable federal, state, and local codes and good industry practice. The Project developer and/or contractor will coordinate directly with the local code enforcement officers in order to assure that all aspects of Project specifications/inspections are properly communicated and understood.

To assure compliance with various environmental protection commitments and permit conditions, Atlantic Wind will hire an environmental monitor to oversee construction (and post-construction) activities. Prior to the start of construction at any given site, an environmental monitor, the contractor, and Atlantic Wind representatives will conduct a walk-over of areas to be affected, or potentially affected, by proposed construction activities. This pre-construction walk-over will identify sensitive resources to avoid (e.g., wetlands, archeological, or agricultural resources), as well as the limits of clearing, location of wetland and stream crossings, location of drainage features (e.g., culverts, ditches), location of underground utilities and tile lines, and layout of sedimentation and erosion control measures. Upon identification of these features, they will be marked in the field (by staking, flagging, fencing, etc.), specific construction procedures will be determined, and any modifications to construction methods or locations will be proposed before construction activities begin. Landowners and agency representatives will be included on these walk-overs or consulted as needed. See Section 4.3 (Environmental Compliance and Monitoring Program) for additional detail.

2.6.2 Staging Areas

Construction staging areas will be developed by stripping and stockpiling the topsoil and grading and compacting the subsoil. Geotextile fabric and an appropriate depth of gravel will then be installed to

create a level working yard. Electric and communication lines will be brought in from existing distribution poles to allow connection with construction trailers. At the end of construction, utilities, gravel, and geotextile fabric will be removed (from staging areas that do not overlap with the proposed operations and maintenance facility) and the sites restored to their preconstruction condition.

2.6.3 Site Preparation

Actual Project construction will be initiated by clearing woody vegetation (as necessary) from all tower sites, access roads, and electrical interconnect routes. The work area will be cleared with a chainsaw, brush hog and typical heavy construction machinery. Trees cleared from the work area will be cut into logs and removed, while limbs and brush will be chipped and spread in upland areas onsite so as not to interfere with agricultural practices or other land uses. Wetland and stream crossings will be conducted in accordance with applicable state and federal permits.

2.6.4 Public Road Improvements

The travel route to be used for hauling gravel, concrete and other heavy items has yet to be finalized, but will be determined in consultation with the turbine supplier, its transportation provider, the local towns and Jefferson County. Certain town roads with widths of less than 16 feet may need to be widened, and turn-outs at the intersection of Project access roads and certain town roads will be temporarily established, to allow an uninterrupted flow of construction activity. Public roadway intersections along the construction and delivery routes may also require spot radii improvements to accommodate the turning radius of over-length delivery vehicles (see Section 3.8 for further detail).

Any stockpiled soil and/or spoil material will only be temporary (i.e., spread and graded to match original contours following construction activities). In addition, appropriate sediment and erosion control measures (see Section 3.1 for additional information and Appendix E for details) will be implemented, which will ensure that temporarily stockpiled soil and/or spoil material will not result in significant sedimentation or turbidity to local surface waters.

2.6.5 Access Road Installation

Wherever possible, existing roads and farm drives will be upgraded for use as Project access roads in order to minimize impacts to both active agricultural areas and wetland/stream areas. Where an existing road or farm drive is unavailable or unsuitable, new gravel- surfaced access roads will be constructed. Road construction will involve topsoil stripping and grubbing of stumps, as necessary. Stripped topsoil will be stockpiled along the road corridor for use in site restoration. Any grubbed

stumps will be removed, chipped, or buried. Following removal of topsoil, subsoil will be graded, compacted, and surfaced with an appropriate depth of gravel or crushed stone. A geotextile fabric or grid may be installed beneath the road surface, if necessary, to provide additional support. The typical access road will be 16 feet in width, with occasional wider pull-offs to accommodate passing vehicles. Appropriately sized culverts will be placed in any wetland/stream crossings in accordance with state and federal permit requirements. In other locations culverts may also be used to assure that the roads do not impede cross drainage. Where access roads are adjacent to, or cross, wetlands, streams or drainage ditches/swales, appropriate sediment and erosion control measures (e.g., silt fence) will be installed.

During construction, access road installation and use could result in temporary disturbance of a maximum width of 100 feet along linear segments, with larger impact areas at curves and intersections. The minimum temporary road corner radius is 150 feet, larger in some areas depending on the alignment of the proposed roadways. In agricultural areas, topsoil will be stripped and wind-rowed along the access road to prevent construction vehicles from driving over undisturbed soil and adjacent fields. Once construction is complete, temporarily disturbed areas will be restored (including removal of excess road material, de-compaction, and rock removal in agricultural areas) and returned to their pre-construction contours. Typical access road details are included in Appendix A. Photos of access road construction are included in Figure 4.

2.6.6 Foundation Construction

Once the roads are constructed for a particular group of turbine sites, turbine foundation construction will commence on that completed access road section. Foundation construction occurs in several stages including excavation, outer form setting, rebar and bolt cage assembly, casting and finishing of the concrete, removal of the forms, backfilling and compacting, and site restoration. Excavation and foundation construction will be conducted in a manner that will minimize the size and duration of excavated areas required to install foundations.

Initial activity at each tower site will involve stripping and stockpiling topsoil within a 175-foot radius around each tower (maximum area of disturbance of 2.2 acres). Following topsoil removal, backhoes will be used to excavate a foundation hole. In agricultural areas excavated subsoil and rock will be segregated from stockpiled topsoil. 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, and in accordance with all applicable laws to avoid impacts to

sensitive receptors. Pre- and post-blasting inspections of all sensitive receptors in the potential impact areas will be conducted, to document any changes that may be due to blasting. If necessary, dewatering of foundation holes will involve pumping the water to a discharge point, which will include measures/devices to slow water velocities and trap any suspended sediment. Dewatering activities will not result in the direct discharge of water into any streams or wetlands.

The foundation is anticipated to be a spread footer. This foundation type is approximately 11.5-13 feet deep, approximately 60 to 65 feet in diameter, and requires approximately 550 to 600 cubic yards (cy) of concrete. Once the foundation concrete is sufficiently cured, the excavation area around and over it is backfilled with the excavated on-site material. The top of the foundation is a nominal 18-foot diameter pedestal that typically extends 6 to 8 inches above grade. The base of each tower will be surrounded by a 8-foot wide gravel skirt, and an area approximately 100 feet by 75 feet will be developed as a permanent gravel crane pad.

2.6.7 *Electrical Cable Installation*

As mentioned previously, electrical interconnects will generally be sited parallel with Project access roads, but will also follow field edges and cut directly across fields in places. The proposed layout of the electrical interconnect system is illustrated in Figure 3. Where buried cable is proposed to cross active agricultural fields, the location of any subsurface drainage (tile) lines will be determined (through consultation with the landowner), if possible, to avoid damaging these lines during cable installation. Direct burial methods through use of a cable plow, rock saw, and/or trencher will be used during the installation of underground electrical interconnect lines whenever possible. Direct burial via a cable plow will involve the installation of bundled cable (electrical and fiber optic bundles) directly into a “rip” in the ground created by the plow blade. The rip disturbs an area approximately 24 inches wide with bundled cable installed to a minimum depth of 36 inches. An area up to 20 feet wide (for one circuit) must be cleared of tall-growing woody vegetation and will be disturbed by the tracks of the installation machinery. However, this disturbance does not involve excavation of the soil. Generally, no restoration of the rip is required, as it closes in on itself following installation. Similarly, surface disturbance associated with the passage of machinery is typically minimal. Should surface restoration be required, a small excavator or small bulldozer will closely follow the installation, smoothing the area. In order to reduce overall Project impacts, collection routes may be used to support crane walks. In these areas, the collection route would be temporarily widened for this use rather than creating a separate 100-foot width clearing.

Direct burial with a trencher involves the installation of bundled cable in a similar fashion to cable plow installation. The trencher or rock saw uses a large blade or “saw” to excavate an open trench. Alternatively, an excavator or backhoe is used to open a 24-inch-wide trench with a sidecast area immediately adjacent to the trench. Similar to cable plow, this direct burial method installs the cable a minimum of 36 inches deep (48 inches in active agricultural fields) and requires only minor clearing and surface disturbance (up to 20 feet wide for the installation machinery). Sidecast material will be replaced with a small excavator or small bulldozer. All areas will be returned to pre-construction grades, and restoration efforts will be as described above for cable plow installation. Where three or more cables run parallel through active agricultural fields, the topsoil will be stripped and stockpiled prior to cable installation, and replaced, regraded, and stabilized by seeding and mulching following installation. Any tile lines that are inadvertently cut or damaged during installation of the buried cable will be repaired as part of the restoration effort.

Installation of utility lines with an open trench will be used only in areas where the previously described direct burial methods are not practicable. At this time, no open trench installation is proposed unless conditions at the time of construction make direct burial unfeasible. Areas appropriate for open trench installation will be determined at the time of construction and may include areas with unstable slopes, excessive unconsolidated rock, and standing or flowing water. Open trench installation will be performed with a backhoe and will generally result in a disturbed trench 36 inches wide and a minimum of 36 inches deep. The overall temporary footprint of vegetation and soil disturbance may be a maximum of 100 feet due to machinery dimensions and backfill/spoil pile placement during installation and the possibility of a crane walk traveling along the collection system corridor. In agricultural areas, all topsoil within the work area will be stripped and segregated from excavated subsoil. Replacement of spoil material will occur immediately after installation of the buried utility. Subgrade soil will be replaced around the cable, and topsoil will be replaced at the surface. Any damaged tile lines will be repaired, and all areas adjacent to the open trench will be restored to original grades and surface condition. Restoration of these areas will be completed through seeding and mulching of all exposed soils.

The overhead 34.5 kV electrical interconnect will be carried by electrical conductor suspended on treated wood poles (similar to existing roadside utility poles supporting distribution lines). The ROW of the overhead electrical interconnect will be clear cut to a width of 100 feet prior to construction and it is assumed that vehicular activity will disturb a corridor up to 20 feet wide within the ROW for installation of the poles and stringing of the line. Following construction, the cleared ROW will be reduced to a width of 75 feet, which will be maintained free of tall woody vegetation for the duration of Project operation.

2.6.8 Wind Turbine Assembly and Erection

Beyond the tower, nacelle, and rotor blades, other smaller wind turbine components include hubs, nose cones, cabling, control panels and internal facilities such as lighting, ladders, etc. All turbine components will be delivered to the Project site on flatbed transport trucks and specialized large component transport vehicles, and the main components will be off-loaded at the individual turbine site. Turbine erection is performed in multiple stages including setting of the bus cabinet and ground control panels on the foundation, erection of the tower, erection of the nacelle, assembly and erection of the rotor, connection and termination of the internal cables, and inspection and testing of the electrical system prior to energization.

Turbine assembly and erection involves mainly the use of large track mounted cranes, smaller rough terrain cranes, boom trucks, and rough terrain fork-lifts for loading and off-loading materials. The tower sections, rotor components, and nacelle for each turbine will then be delivered to each site by flatbed trucks and specialized large component transport vehicles and unloaded by crane. A large erection crane will set the tower segments on the foundation, place the nacelle on top of the tower, and following ground assembly, place the rotor onto the nacelle (see photos in Figure 4).

The erection crane(s) will move from one tower to another along a designated crane path. This crane travel path will generally follow Project access roads; sometimes will follow existing public roads with protective matting as required; sometimes will follow the collection system from turbine string to turbine string; and in a few places may traverse open fields if field conditions permit. In such areas, a proof roller will be used to test soil stability and level and compact the soil prior to crane passage. If this approach is not feasible, topsoil will be stripped and stockpiled and temporary roads up to 50-foot wide (with a temporary disturbance up to 100-foot wide) will be installed in these areas. In many locations, the crane will be partially disassembled and carried from one tower site to another by a specialized flatbed tractor-trailer. This mode of crane transport will not require a 50-foot-wide travel surface, but could require some additional clearing and grading adjacent to the roads to accommodate the width of the crane tracks (which will extend well beyond the edges of the trailer). Upon departure of the crane from each tower site, all required site restoration activities will be undertaken. Restoration of crane paths will include removal of all temporary fill/road materials. In agricultural fields, restoration will also include subsoil de-compaction (as necessary) and rock removal, spreading of stockpiled topsoil, and reestablishing pre-construction contours. Exposed soils at restored tower sites and along roads and crane paths will be stabilized by seeding and/or mulching.

2.6.9 Substation and Switching Station

Substation and interconnection switching station construction will begin with clearing each site and stockpiling topsoil for later use in site restoration. Sites will be graded, and a laydown area for construction trailers, equipment, materials, and parking will be prepared. Concrete foundations for major equipment and structural supports will be poured, followed by the installation of various conduits, cable trenches, and grounding grid conductors. Above-ground construction will involve the installation of structural steel, bus conductors and insulators, switches, circuit breakers, transformers, control enclosures, etc. The final steps involve laying down crushed stone across the stations, erecting the chain link fence, connecting the high voltage links, and testing the control systems.

During all aspects of Project construction, the contractor and/or construction manager will minimize fugitive dust and airborne debris to the maximum extent practical by implementing appropriate control measures. These measures will include (but are not limited to) the application of mulch, water, stone, or an approved chemical agent on any public roads, access roads, exposed soils, or stockpiled soils when dry and windy conditions exist. Other mechanisms to initiate dust control procedures include a determination from the Environmental Monitor that control measures shall be implemented, and a complaint by a landowner or local resident. A watering vehicle shall be available for use for the duration of Project activities, including restoration. No chemical dust control measures will be implemented in the vicinity of organic farms (if applicable).

2.7 OPERATIONS AND MAINTENANCE

Operation of the wind turbines and associated components is almost completely automated. For the wind turbines anticipated for the Project, turbines will automatically be brought on line at a minimum wind speed of approximately 6.7 mph and high-speed shutdown occurs at around 56 mph. The turbines are equipped with two fully independent braking systems that allow the rotor to be brought to a halt under all foreseeable conditions. The system consists of aerodynamic braking by the rotor blades and by a separate hydraulic-disc brake system. Both braking systems operate independently, such that if there is a fault with one, the other can still bring the turbine to a halt. Each wind turbine has a computer to control critical functions, monitor wind conditions, and report data back to a SCADA system.

However, the Project is anticipated to employ a staff of approximately eight to eleven O&M staff (four wind technicians, a plant manager and an administrative support person). Operations and

maintenance staff offices will be located in the O&M building, and staff will be on duty during core operating hours (eight hours a day, five days per week) with weekend shifts and extended hours as required. In the event of turbine or facility outages, the SCADA system will send alarm messages to on-call technicians to notify them of the outage. The Project will always have an on-call local technician who can respond quickly in the event of any emergency. The wind turbines selected for the Project have been chosen in part for their high functional reliability. Each wind turbine manufacturer studies and reports on the frequency of operation problems and malfunctions that arise when the turbines are generating electricity. Data on the turbines' reliability is summarized by the manufacturer in the turbine's availability rating, which estimates the percentage of time that the turbine will function. More detailed specifications on the wind turbines being proposed for the Project are included in Appendix A.

Each wind turbine will receive scheduled preventive maintenance inspections during the first year of operation and twice a year in subsequent years. Given the high availability rating of the turbines, Atlantic Wind estimates that once operational, individual wind turbines will require maintenance and repair calls an average of three to six times per year in addition to their scheduled inspections. In certain circumstances, heavy maintenance equipment, such as a lifting crane, may need to be brought in to repair turbine problems (such as nacelle component replacement).

The Project sponsor has a proven track record in both constructing and operating commercial-scale wind farms. This should provide assurance that Project maintenance and repair work will be completed quickly and with as little impact to the surrounding community and landowners as possible.

The Horse Creek Wind Power Project is expected to have an average annual capacity of approximately 30 percent, which is comparable to other commercial wind farms in New York State. Total net generation delivered to National Grid's existing 115 kV line is expected to be approximately 260 GWh, or enough electricity to meet the average annual consumption of approximately 48,000 average NYS households. By way of comparison, the U.S. Census Bureau indicates a total of 43,938 households in Jefferson County (U.S. Census Bureau, 2005-2009 American Community Survey).

2.8 DECOMMISSIONING AND CLOSURE PLANS

At the start of construction, an acceptable form of security, including a combination of corporate guarantees and a funded escrow account along with the projected salvage value of the towers and

turbines (expected to be available from the dismantling of the Project), will be available to pay for the decommissioning of the Project at the end of its useful life. Specifically, the Project sponsor will provide a bona fide estimate from an independent engineer for the town's review and approval, in order to establish the cost of decommissioning the wind energy facility. Project sponsor will commence funding the decommissioning account in accordance with the provisions of the agreement entered into with the host town. In the event that Project sponsor uses only a portion of the fund or uses other means than the fund to effect decommissioning it will be entitled to such unused fund amounts with interest upon completion of such decommissioning.

Prior to the granting of local approvals for Project development, Project sponsor will formulate a decommissioning plan with the town, or demonstrate that the private land leases provide adequate requirements for this plan.

Unless otherwise agreed between the town and Project sponsor, and unless Project sponsor can show that its land leases adequately address this issue, the Decommissioning Plans will include:

- Provision describing the triggering events for decommissioning of wind power facilities.
- Provisions for the removal of all above-ground structures and debris, but not the removal of anything below a 36-inch depth (e.g., tower foundations or collection line).
- Provisions for the restoration of the soil and vegetation.
- A timetable approved by the town for site restoration.
- An estimate of decommissioning costs certified by an independent Professional Engineer.
- Financial Assurance, secured by Atlantic Wind, LLC, for the purpose of adequately performing decommissioning, in an amount equal to the Professional Engineer's certified estimate of decommissioning cost, less the expected salvage cost of the wind farm components.
- Identification of procedures for the town to access financial assurances.
- A provision that the terms of the Decommissioning Plan shall be binding upon Atlantic Wind or any of their successors, assigns, or heirs.
- A Provision that the town shall have access to the site, pursuant to reasonable notice, to inspect the results of complete decommissioning.
- Removal of machinery, equipment, tower, and all other materials related to the Project is to be completed within one year of decommissioning.
- All town, county or state roads, impacted by Project activity, if any, will be restored to original condition upon completion of decommissioning.

Megawatt-scale wind turbine generators typically have a life expectancy of 20 to 25 years. The current trend in the wind energy industry has been to replace or “re-power” older wind energy Projects by upgrading older equipment with more efficient turbines. However, if not upgraded or if the turbines are non-operational for an extended period of time (such that there is no expectation of their returning to operation), they will be decommissioned, in accordance with the local wind power ordinance. Decommissioning would consist of the following activities: all turbines, including the blades, nacelles, and towers will be disassembled, and transported off site for reclamation and sale. All of the transformers will also be transported off-site for reuse or reclamation. All underground infrastructure at depths less than 36 inches below grade will be removed. All underground infrastructure at depths greater than 36 inches below finished grade (including the subsurface collection conductors, and foundations) will be left in place. Areas where subsurface components are removed will be graded to match adjacent contours, stabilized with an appropriate seed mix, and allowed to re-vegetate naturally.

As mentioned, a decommissioning plan that details the process, estimated cost, salvage value, and site restoration will be provided to the Town of Clayton prior to Project operation. All decommissioning and restoration activities will be in accordance with all applicable federal, state, and local permits and requirements and will include the following:

Turbine removal: Cranes and/or other machinery will be used for the disassembly and removal of the turbines. Electronic components and controls, and internal cables will be removed. The rotor and nacelle will be lowered to the ground for disassembly. The tower sections will be lowered to the ground where they will be further disassembled for transporting. The rotor, nacelle, and tower sections will either be transported whole for reconditioning and reuse or dissembled into salvageable, recyclable, or disposable components.

Turbine foundation removal: Turbine foundations will be partially removed down to the base level of the foundation pedestal, below grade. The remaining excavation will be filled with clean sub-grade material, compacted to a density similar to surrounding sub-grade material, and finished with topsoil.

Underground collection cables: Any buried cables located within 36 inches of the ground surface will be removed. Buried cables at a depth greater than 36 inches will be kept in place if it is determined that their presence does not adversely impact land use and they do not pose a safety hazard.

Access roads and crane pads: At the discretion of the landowner, gravel will be removed from access roads and crane pads and transported to a pre-approved disposal location. Any drainage structures will be removed and backfilled with sub-grade material (if necessary). The ground will be de-compacted (in agricultural areas only), surfaced with topsoil, contoured, and re-vegetated.

Monitoring. In accordance with the guidelines of the New York State Department of Agriculture and Markets, a monitoring and remediation period of two years immediately following the completion of any decommissioning and restoration activities in agricultural land will commence. Any remaining agriculture impacts can be identified during this period and follow-up restoration efforts will be implemented.

2.9 REQUIRED REVIEWS, APPROVALS AND APPLICABLE REGULATORY PROGRAMS

Implementation of the Project will require certain regulatory reviews, permits and/or approvals from local, state, and federal agencies. The permits and approvals that are expected to be required are listed in Table 1.

Table 1. Reviews, Permits and Approvals for the Horse Creek Wind Project

Agency	Agency Status	Description of Permit or Approval Required
Town of Clayton		
Town of Clayton Planning Board	Lead Agency	Site Plan Approval. Acceptance of DEIS, FEIS, and issuance of Findings (as Lead Agency under SEQRA). Wind Energy Facility Permit. Approval of Town Road Agreements.
Town of Clayton Departments (Public Works, Codes, etc.)	Interested Agency	Issuance of building permits. Review and approval of highway work permits.
Jefferson County		
Department of Public Works	Interested Agency	Highway work permits.
Jefferson County Planning Board	Interested Agency	Advisory Opinion pursuant to General Municipal Law 239-m.

Agency	Agency Status	Description of Permit or Approval Required
New York State		
Department of Environmental Conservation	Involved Agency	Article 24 Permit for disturbance to state jurisdictional wetlands. Article 15 Permit for disturbance of protected streams. SPDES General Permit for Stormwater Discharges from Construction Activity. Article 11 Permit for Incidental Take of Endangered/Threatened Species. Section 401 Water Quality Certification. Issuance of SEQRA findings.
Public Service Commission	Involved Agency	NY Public Service Law §68 Certificate of Public Convenience and Necessity. Issuance of SEQRA findings.
Department of Transportation	Interested Agency	Special Use Permit for oversize/overweight vehicles. Highway work permit.
NYSOPRHP	Interested Agency	Consultation pursuant to NY Parks, Recreation and Historic Preservation Law (PRHPL) § 14.09 and § 106 of the National Historic Preservation Act.
Federal		
U.S. Army Corps of Engineers	N/A	Section 404 Individual Permit or Nationwide Permit for placement of fill in federal jurisdictional wetlands/waters.
U.S. Fish and Wildlife Service	N/A	Consultation and conference activities pursuant to Section 7 of the Endangered Species Act, associated with the aforementioned Section 404 Permit.
Federal Aviation Administration	N/A	Lighting Plan and clearances for potential aviation hazard.

2.10 PUBLIC AND AGENCY INVOLVEMENT

Since first initiating development work on this Project in 2003, the Project sponsor has had numerous meetings with the Town Board and the Planning Board of the town of Clayton and federal and state agencies. The development process was temporarily delayed from 2007 to 2009 in order to observe the potential effects of White Nose Syndrome on bat populations and assess measures being studied to reduce impacts to bats.

The earliest public action in the town was a variance application required for the installation of the first two wind measurement towers. The Project sponsor representatives met with Clayton town officials on December 11, 2004 to apply for a height variance needed to install a meteorological tower.

In November 2005, the Project sponsor staffed a booth at the National Association of Conservation Districts conference, held in Jefferson County, with information about wind energy and Iberdrola's proposed projects in New York State, including the wind farm proposed in the Clayton area. Additionally, in September and November Atlantic Wind staff attended informational meetings with the USFWS, U.S. Army Corps of Engineers (USACOE), and NYSDEC.

The Project sponsor appeared at a public hearing called by the Clayton Town Board on May 24th, 2006 to make a general wind power representation, with specific information about Atlantic Wind's proposal for a wind farm in the Clayton area, and to answer questions from members of the public. A Site Plan application was submitted to the Town of Clayton on January 6, 2011 for the Project.

Additionally, the Project sponsor met several times with a citizens wind committee, as well as the Town Board itself as these bodies considered adoption of new wind power facility ordinance. Meetings with the Town and citizens committee are summarized as follows:

- August 23, 2006: Appeared before the Town Board to discuss the concept of a wind ordinance for Clayton;
- October 3, 2006: Met with a citizens committee that had been established to consider zoning changes;
- October 23, 2006: Met with the Town Board again to discuss schedule;
- December 6, 2006: Attended a special Town Board meeting to discuss the proposed wind farm;
- January 3, 2007: Attended a Town Board meeting to discuss adoption of the ordinance;
- January 11, 2007: Attended a Planning Board meeting;
- January 15, 2007: Attended a ZBA meeting to discuss a variance for another meteorological tower to be installed in Clayton;
- On January 25, 2007: Attended a joint Town Board/Planning Board meeting to discuss the SEQRA review schedule.

The Project sponsor has also held two receptions with local landowners interested in participating in Horse Creek Wind Farm on April 27, 2006, and on December 5, 2006, both at the Depauville Fire Hall.

In addition, representatives of the Project sponsor have met with both staff at both USFWS and NYSDEC to discuss development of a wind farm in Clayton, and additional consultations with these and other State and Federal Agencies are expected in coming months.

2.10.1 SEQRA Process

In January 2007, the Project sponsor proposed an alternate Project layout and configuration that was the subject of an environmental impact analysis and local review (see Larger Project Area Alternative in Section 5). A summary of the environmental review process under taken for this previous Project may be reviewed in the *Draft Generic Environmental Impact Statement for the Horse Creek Wind Farm* accepted by the Town of Clayton as Lead agency on February 22, 2007. This documentation of the alternative project was reviewed by the public and subsequently was withdrawn. The Project sponsor suspended the Project, largely in consideration of agency concerns related to potential bat impacts.

On January 6, 2011, a site plan application was submitted by Atlantic Wind to the Town of Clayton Town Board pursuant to SEQRA. The formal submittal of the local site plan review application initiated the SEQRA process for the subject action. Subsequent to this action, a solicitation of Lead Agency status was forwarded to involved SEQRA agencies by the Clayton Planning Board, along with a copy of the EAF document. No agency objected to the Town Board's assuming the role of Lead Agency. The Town Clayton Planning Board, as Lead Agency, issued a Positive Declaration in requiring the preparation of this DEIS.

This document has been prepared in accordance with the requirements of SEQRA (6 NYCRR Part 617). The purpose of the DEIS is to assess the environmental impacts associated with construction of the Project. The SEQRA process for the Project will include the following actions and time frames:

- DEIS accepted by Lead Agency (Clayton Planning Board).
- File notice of completion of DEIS and notice of public hearing and comment period.
- Public hearing on DEIS
- A minimum 30-day public comment period.
- Prepare the Final EIS (FEIS) to address relevant comments received during the public comment period/public hearing.
- FEIS accepted by Lead Agency.
- File notice of completion of FEIS.

- Minimum 10-day public consideration period.
- Lead Agency issues Findings Statement, completing the SEQRA process.
- Involved agencies issue Findings Statements.

This DEIS, along with a copy of the public notice, will be distributed for review and comment to the repositories, agencies and parties listed in Table 2. Additionally, a 2005 amendment to SEQRA, (Chapter 641 of the NYS Laws of 2005; “Ch. 641”) requires every Environmental Impact Statement to be posted on a publicly accessible Internet website, as of February 26, 2006. A DEIS is to be posted as soon as it is accepted and remain posted until the FEIS is accepted. The FEIS should be posted when completed, and must remain posted until one year after all final approvals have been issued for the Project that is the subject of the FEIS. In accordance with this amendment to SEQRA, the DEIS will be posted to www.iberdrolarenewables.us/horsecreek.

2.10.2 Agency and Public Review

Opportunities for detailed agency and public review will continue to be provided throughout the SEQRA process, as well as in conjunction with the review of applications for the other permits and approvals needed for the Project. With respect to the SEQRA process, the DEIS will be available for public review and agency comment as outlined above. In addition to a public comment period (during which time written comments will be accepted), a duly noticed public hearing concerning the DEIS will be organized and held, in accordance with SEQRA requirements.

This DEIS, along with a copy of a public notice, will be distributed for review and comment to the public and to the parties identified in Table 2.

Table 2. Public DEIS Repositories

Town of Clayton	
Town of Clayton Town Supervisor Justin A. Taylor 405 Riverside Drive Clayton, New York 13624	Town of Clayton Town Clerk Kathleen E. LaClair 405 Riverside Drive Clayton, New York 13624
Town of Clayton Planning Board Roland Barril 405 Riverside Drive Clayton, New York 13624	Town of Clayton Highway Department Robert Boulton 615 East Line Rd Clayton, New York 13624
Hawn Memorial Library John Street Clayton, New York 13624	

Jefferson County	
Jefferson County Industrial Development Agency 800 Starbuck Avenue, Suite 800 Watertown, New York 13601	Jefferson County Planning Department Donald R. Canfield, Director 175 Arsenal Street Watertown, New York 13601
Jefferson County Highway Department Highway Superintendent 21897 County Road 190 Watertown, NY 13601	County Legislature District 1 Michael Docteur 33112 NYS Route 12E Cape Vincent, New York 13624
New York State	
NYS Department of Environmental Conservation 635 Broadway Albany, New York 12233-1011	NYS Department of Public Service Three Empire State Plaza Albany, New York 12223-1350
NYS Department of Environmental Conservation Region 6 Regional Permit Administrator 317 Washington Street Watertown, NY 13601	NYS Department of Transportation 50 Wolf Road 6 th Floor Albany, New York 12232
NYS Department of Agriculture and Markets 10 b Airline Drive Albany, New York 12235	NYS Energy Research and Development Authority Corporate Plaza West 286 Washington Ave. Ext. Albany, New York 12203-6399
NYS Department of Transportation Region 2 Regional Director Utica State Office Building 207 Genesee Street Utica, NY 13501	NYS Office of Parks, Recreation and Historic Preservation Field Services Unit Peebles Island Waterford, New York 12118

3.0 EXISTING CONDITIONS, POTENTIAL IMPACTS, AND MITIGATION MEASURES

This section describes the existing environmental conditions within the Project area and in some instances, the surrounding area. It further describes the environmental impacts expected to result from the Project as it is presently envisioned as described in Section 2.0 and illustrated in Figure 3. Included are analyses of short-term impacts likely to occur as a result of construction activities, as well as impacts expected to result from long-term operation and maintenance of the Project. Finally, this section describes the various measures proposed to avoid, minimize or mitigate significant adverse environmental impacts. Information is presented on geology, soils and topography; water resources; biological resources; aesthetic/visual resources; land use and zoning; socioeconomics; transportation; cultural resources; communication facilities; sound; public safety; and community services. For the purposes of quantifying the temporary, permanent, and total impacts to each evaluated resource area, and ultimately determine appropriate mitigation measures, the assumptions in Table 3 have been applied.

Table 3. Project Impact Assumptions

Project Components	Typical Area of Vegetation Clearing	Area of Total Soil Disturbance (temporary and permanent)	Area of Permanent (fill/structures) Disturbance
Wind Turbines and Workspaces	175' radius per turbine	175' radius per turbine	0.2 acre per turbine (pedestal plus crane pad)
Access Roads	100' wide per linear foot of road	100' wide per linear foot of road	20' wide per linear foot of road
Crane Paths	100' wide per linear foot of crane path	100' wide per linear foot of crane path	None
Buried Electrical Interconnects	20' wide per linear foot of cable	20' wide per linear foot of cable	None
Overhead Electrical Interconnects	100' wide (reduced to 75' following construction) per linear foot of cable	20' wide per linear foot of cable	Minimal (less than 0.1 acre in total)
O&M Building (6,000 sf) and associated laydown storage yard	5 acres	5 acres	4 acre
Wind Measurement Tower	1.0 acre	1.0 acre	0.1 acre

Project Components	Typical Area of Vegetation Clearing	Area of Total Soil Disturbance (temporary and permanent)	Area of Permanent (fill/structures) Disturbance
Staging Areas	Up to 35 acres	Up to 35 acres	none
Collector Substation/Switching	3 acres	3 acres	2 acres

Due to the nature, scope and scale of wind farm design and development, many potential impacts described herein, and the correlating mitigation options, are based upon a conservative evaluation of Project impacts. In many cases potential impacts are based upon “worst-case” assumptions and/or anticipated permit conditions. Based on these generally conservative impact assumptions, appropriate mitigation measures are then presented. For example, temporary construction- related transportation impacts are described based upon a preliminary transportation routing and delivery plan that will be finalized upon selection of a contractor, in accordance with town, county, and state issued highway work permits and road agreements. For the purposes of SEQRA analysis, worst case assumptions are made regarding the type and extent of construction related impacts that may be expected (e.g. increased turning radii, culvert replacement). Actual impacts and correlating avoidance, minimization, and/or mitigation measures, will not be known until the appropriate reviewing agencies have seen detailed plans or engineering design and made a permit decision based upon this more detailed information. As a matter of law, these permit conditions may not be made until SEQRA review is concluded. However, because “worst-case” assumptions have been applied during SEQRA review, these impacts will constitute *thresholds*. If final Project siting results in impacts which exceed these established thresholds, Project modifications will be undertaken, or a supplemental SEQRA evaluation will be conducted. This approach is typical to other projects of this scale, and in particular to wind power facilities, and is done in accordance with SEQRA.

3.1 TOPOGRAPHY, GEOLOGY, AND SOILS

3.1.1 Existing Conditions

The Project area encompasses approximately 9,450 acres of land. Information regarding topography, geology, and soils was obtained from aerial surveys, on-site observations and existing published sources, in addition to information provided in a Preliminary Geotechnical Engineering Assessment prepared by GZA GeoEnvironmental, Inc. of New York (GZA), a Report of Preliminary Subsurface Investigation and Geotechnical Evaluation by Atlantic Testing Laboratories (ATL), and a Preliminary Karst Condition Assessment prepared by Terracon Consultants, Inc. (Terracon) (Appendices B, C and D). Sources of information referenced include the Jefferson County Soil

Survey (U.S. Department of Agriculture [USDA], 1989), Soil Survey Geographic Database (SSURGO), Natural Resources Conservation Service (NRCS), U.S. Geological Survey (USGS) topographic mapping, current and historical aerial photography, New York State Library, statewide bedrock geology mapping (NYS Museum/NYS Geological Survey, 1999a), and New York State surficial geology mapping (NYS Museum/NYS Geological Survey, 1999b). Additionally, GZA obtained local information from the NYSDEC, the Town of Clayton Building and Zoning Department, and the Jefferson County Fire Prevention and Building Code Office regarding specific code requirements for the construction of wind energy structures.

3.1.1.1 Topography

The Project area is located in the Erie Ontario Lowlands physiographic province of Jefferson County (USDA, 1989). The topography of this physiographic area ranges from nearly level to gently rolling. The Project area is located within the clay plains portion of this lowland area, characterized by nearly level, prairie-like areas of clayey soils (USDA, 1989). The greatest topographic relief in the Project area occurs in the northwestern portion where there is a relatively abrupt descent to the broad valley of the Chaumont River. Elsewhere, there is very little topographic relief generally consisting of shallow valleys associated with Horse Creek, Buttermilk Creek, and tributaries to Stone Mills Creek and the Chaumont River. Slopes range from 0 to 25 percent but are predominantly 0 to 8 percent. Elevations range from approximately 280 feet above mean sea level (amsl) along the Chaumont River in the northwestern portion of the Project area to approximately 470 feet amsl in the far eastern portion of the Project area near the intersection of Overbluff Road (County Route 12) and Wilder Road. Excluding the Chaumont River valley, the lowest elevation in the Project area is approximately 340 feet amsl in the southern portion of the site (See Figure 5).

3.1.1.2 Geology

The bedrock within the Project area is part of the Black River Group and is composed of Limestone of the Ordovician Age (NYS Museum/NYS Geological Survey, 1999a; USDA, 1989). In general, depth to bedrock is typically in the range of 20 to 30 inches, although bedrock was observed at the surface in some areas and is at a depth of greater than 60 inches in other areas (USDA, 1989). Surface geologic materials within the Project area are composed of lacustrine silt and clay, which are generally calcareous, low permeability materials of variable thickness deposited in proglacial lakes (NYS Museum/NYS Geological Survey, 1999b). Based on the subsurface testing performed by ATL in 2007, bedrock can generally be expected to be encountered within 1.5 to 5.5 feet of the ground surface within the Project area, and in some instances is exposed across the Project area (see Appendix C).

Karst conditions are present within the Project area. According to the USGS (2010a), “Karst is a terrain with distinctive landforms and hydrology created from the dissolution of soluble rocks, principally limestone and dolomite. Karst terrain is characterized by springs, caves, sinkholes, and a unique hydrogeology that results in aquifers that are highly productive but extremely vulnerable to contamination.” Terracon conducted a site visit in November of 2010 to visually review existing ground conditions near proposed wind turbine locations and along proposed access roads for indications of Karst conditions. Depressions and sinkholes were observed near proposed Turbines 5, 30, 34, 38, 41, and 54, as well as along the access road between Turbines 49 and 50, and from County Road 54 to Turbines 5 and 6 (see proposed wind turbine locations in Figure 3). The sinkholes ranged in size from a few inches to over 10 feet in diameter, with depths ranging from one to four feet (Turbines 10, 11 and 17 were not evaluated due to dense woody vegetation). Terracon noted a significant amount of exposed bedrock throughout the Project site and concluded that bedrock likely occurs within 10 feet of the ground surface throughout the Project site, in concurrence with the assessments conducted by both GZA and ATL.

Based on the shallow depth of bedrock and exposed rock, Terracon classified the sinkholes on-site mainly as solution sinkholes. Solution sinkholes generally result in a gradual depression and subsidence of the ground surface, but rarely cause abrupt or catastrophic ground collapse. Collapsing sinkholes occur when a solution cavity becomes so large that it cannot support the weight of the overburden materials. This type of sinkhole usually occurs quickly and has the potential to be catastrophic. Terracon noted two “disappearing streams” or “drains” during their site visit, which have the potential to focus a significant amount of water into the underlying bedrock, increasing the rate of erosion and dissolution of bedrock. See Appendix D for further information regarding on-site karst conditions, including site photograph documentation.

3.1.1.3 Soils

The Soil Survey of Jefferson County, New York (USDA, 1989) has mapped general soil associations and soil types within the Project area (see Tables 4 and 5 below and Figure 6). This soil survey indicates that three soil associations, and 37 soil map units, are present within the Project area. The dominant soil map units within the Project area (as defined by coverage of greater than 1,000 acres) are Chaumont silty clay 0-3 percent slopes, Chaumont silty clay 3-8 percent slopes, Galoo-Rock outcrop complex 0-8 percent slopes, and Wilpoint silty clay loam 3-8 percent slopes. Soils in the Project area are variable, with drainage ranging from excessively drained to very poorly drained, depths ranging from rock outcrops to greater than 5 feet, and parent materials including glacial lake

deposits and glacial till. Soil textures in the Project area range from clay to very rocky but are primarily silty clay, silty clay loam, and silt loam. Table 4 lists the soil associations found within the Project area and their characteristics. Table 5 summarizes the characteristics of the four dominant soil map units found in the Project area.

Table 4. Soil Associations Within the Project Area¹.

Soil Association	Main Characteristics
Chaumont-Galoo-Wilpoint-Guffin ²	<ul style="list-style-type: none"> • Excessively drained to very poorly drained • Moderately deep to very shallow soils • Clayey or loamy soils • On lowland plains • Formed in marine and glacial lake deposits
Vergennes-Kingsbury-Elmridge	<ul style="list-style-type: none"> • Somewhat poorly drained clayey soils and moderately well drained loamy soils over clayey sediments • Very deep soils • On lowland plains • Formed in marine and glacial lake deposits
Benson-Newstead-Galoo-Rock outcrop	<ul style="list-style-type: none"> • Excessively drained to poorly drained • Moderately deep to very shallow soils • Loamy soils and rock outcrop • On lowland plains and uplands • Formed in glacial till

¹Information gathered from the Soil Survey of Jefferson County, New York (USDA, 1989).

²This soil association covers the vast majority of the Project area.

Table 5. Dominant Soil Map Units Within the Project Area¹.

Soil Map Unit	Main Characteristics
Chaumont silty clay 0-3 percent slopes	<ul style="list-style-type: none"> • Somewhat poorly drained • Overlies limestone bedrock • Depth to bedrock is 20 to 40 inches • On slightly convex, broad flats on lowland plains
Chaumont silty clay 3-8 percent slopes	<ul style="list-style-type: none"> • Somewhat poorly drained • Overlies limestone bedrock • Depth to bedrock is 20 to 40 inches • On concave, sloping areas on lowland plains
Galoo-Rock outcrop complex 0-8 percent slopes	<ul style="list-style-type: none"> • Excessively drained and somewhat excessively drained Galoo soils and areas of rock outcrop • Galoo soils are very shallow with a depth of 2 to 10 inches to bedrock • Overlies limestone or calcareous sandstone bedrock • On undulating ridges and knolls

Soil Map Unit	Main Characteristics
Wilpoint silty clay loam 3-8 percent slopes	<ul style="list-style-type: none"> • Moderately well drained • Overlies limestone bedrock • Depth to bedrock is 20 to 40 inches • On convex slopes

Information gathered from the Soil Survey of Jefferson County, New York (USDA, 1989).

The Project area contains relatively small, dispersed areas of prime farmland soils as listed by NYSA&M, totaling 345 acres (see Figure 6). Claverack loamy fine sand (map unit CmB), Collamer silt loam (map unit CnB) and Galway silt loam (map units GIA and GIB) are the most common prime farmland soils within the Project area. However, prime farmland soils only represent a small subset of overall agricultural land in the Project area. As discussed further in Section 3.3, agricultural land accounts for approximately 44% (or 4,155 acres) of the overall land within the Project site. Agricultural land in the Project site consists of hay fields, row crops and pastureland.

The Soil Survey of Jefferson County has classified the erosion hazard for each soil type as slight, moderate, or severe. With the exception of two areas in the vicinity of Turbine 41 and Turbine 12, the Project area is classified with an erosion hazard of “slight.” Soil drainage characteristics are variable, as previously mentioned, with approximately 27 percent of the area well drained to excessively drained, 13 percent moderately well drained, and 60 percent somewhat poorly drained to very poorly drained (USDA, 1989). Terracon observed standing water at numerous locations throughout the Project area, particularly in agricultural areas, during their site visit after four days of dry weather and noted that the slow infiltration rates of site soils would effectively slow the erosion of the underlying limestone.

3.1.2 Potential Impacts

Project components have been sited to avoid or minimize either temporary or permanent impacts to topography, geology, and soils to the maximum extent practicable. Based upon the proposed Project layout, documented existing conditions, studies conducted to date, and impact assumptions provided in Table 3 (above), anticipated temporary (construction-related) and permanent (operational) impacts to topography, geology and soils are presented below.

3.1.2.1 Construction

3.1.2.1.1 *Topography*

Only temporary, localized minor impacts to site topography are expected as a result of construction activities. For example, some cut and fill or addition of fill will be required at some turbine sites, along some access roads and public road intersections; however, the impact to overall topography will be minor due to the nearly level elevation throughout the majority of the Project area. Construction on steep slopes (i.e., in excess of 15%) is anticipated to be limited to the short segment of overhead interconnect south of Turbine 41 (see Figure 3). Potential impacts to site topography have been minimized by siting turbines in relatively level locations and using existing roads and level areas for turbine access wherever possible.

3.1.2.1.2 *Geology*

According to ATL's preliminary subsurface investigation, the bedrock on site is structurally suitable for support of foundations and/or building construction. However, depth to bedrock in the Project area is relatively shallow and it is likely that some turbine foundations will be set into bedrock. Bedrock is anticipated to be ripable, and will thus primarily be excavated by a backhoe. According to ATL, blasting of shallow or exposed rock and rock excavation (pneumatic jacking or hydraulic fracturing) may be required to achieve the proposed foundation depth. In addition, GZA provided a preliminary blasting plan as part of their Preliminary Geotechnical Engineering Assessment included as Appendix B. Given the proposed turbines' distance from adjacent development (typically, turbines are at least 1,250 feet from the nearest non-participating residence), there should be no significant blasting-related impacts on nearby wells or foundations.

With respect to karst conditions identified in the Project area, Terracon indicated that from a development standpoint, solution sinkholes generally pose a limited risk for long-term damage because surficial indications such as depressions and ground subsidence become evident prior to significant movement. When evidence is discovered, solution cavities can typically be controlled by the use of grout or lean concrete. Collapsible sinkholes which were not identified in the Project area pose a greater risk to development because these features do not exhibit signs of distress until collapse is imminent. Terracon recommended consideration of moving development away from the areas where "disappearing streams" were observed (near proposed O&M facility located at State Route 12 and Miller Road and turbine 54).

3.1.2.1.3 Soils

The primary impact to the physical features of the Project area will be temporary disturbance of soils during the installation of access roads, turbine foundations and workspaces, buried or above ground electrical interconnects, the O&M facility, staging areas, and the substation. Descriptions of these construction practices are provided in Section 2.6. Based on the assumptions outlined in Table 3 (above), temporary soil disturbance from all anticipated construction activities will total approximately 467.5 acres. The majority of disturbances to soils will be restored following construction (419 acres). Approximately 48.5 acres of land will be converted to built facilities. Total, temporary and permanent impacts to soils by component type are presented in Table 6.

Table 6. Approximate Area of Soil Disturbance During Construction

Component	Total Area Disturbed During Construction (Acres)	Area Restored Following Construction (Acres)	Permanent Soil Disturbance (Acres)
Wind Turbines and Workspaces	106.0	96.4	9.6
Access Roads	163.4	130.7	32.7
Crane Paths	102.0	102.0	0
Buried Electrical Interconnects	38.8	38.8	0
Overhead Electrical Interconnects	13.3	13.3	Minimal
O&M Building (6,000 sf) and associated laydown storage yard	5.0	1.0	4.0
Wind Measurement Towers	1.0	0.9	0.1
Staging Areas	35.0	35.0	0
Collector Substation/Switching Station	3.0	1.0	2.0
Total Soil Disturbance (Rounded Figure)	467.5	419	48.5

As indicated in Table 6, total and temporary soil disturbance will occur in all areas. The significance of this disturbance will be highly variable based on the specific construction activity, the construction techniques employed, and soil/weather conditions at the time of construction. For instance, in many locations installation of the buried electrical interconnects will involve relatively minor soil disturbance, restricted to the path of the installation equipment. However, because such conditions

cannot be guaranteed within the area of disturbance, for calculation purposes it is assumed the entire area would be stripped of topsoil and significant disturbance of subsoil would occur.

Earth moving and general soil disturbance will increase the potential for wind/water erosion and sedimentation into surface waters. However, construction will occur almost entirely over soils with an erosion hazard of “slight” (as classified by County Soil Survey) with only two exceptions: 1) a short segment of overhead interconnect south of Turbine 41, leading to the proposed substation, crosses a soil with a severe erosion hazard; and 2) portions of the workspace and interconnect associated with Turbine 12 are sited over a soil with a moderate erosion hazard.

Construction activity also has the potential to impact soil in agricultural fields through rutting, mixing of topsoil and subsoil, and soil compaction, including the previously mentioned soils classified as prime farmland soils by the NYSA&M. Specifically, of the total impacts to soils anticipated to result from Project construction (467.5 acres), approximately 316.5 acres are within active agricultural land. Of the 316.5 acres of total soil disturbance within active agricultural land, approximately 282.5 acres will be restored, and approximately 34 acres will be permanently converted to built facilities including turbines, access roads, collection substation/switching station, O&M facility, and the meteorological tower.

3.1.2.2 Operation

Overall, the Project will result in permanent conversion of approximately 48.5 acres of land into built facilities (0.2 acre of crane pad and foundation at each tower site, maximum 20-foot-wide permanent access roads with grass shoulders, a 2-acre collection substation and switching station, and a 4-acre O&M building and associated storage yard). Beyond occasional soil disturbance associated with Project maintenance and repair, impacts of the operation of the Project on topography, geology, and soils are expected to be minimal. No potential impacts to steep slopes are anticipated during operation of the Project.

3.1.3 *Proposed Mitigation*

3.1.3.1 Topography

Impacts to topography have been largely avoided by siting Project components so as to minimize disturbances to localized topography or overall Project site contours and grades. Therefore, mitigation for impacts to topography is not necessary or proposed.

3.1.3.2 Geology

Impacts to geology have been largely avoided by siting Project components so as to minimize disturbances to exposed bedrock. As a result of their subsurface investigation of bedrock conditions, ATL proposed the use of a spread foot foundation for the turbines. ATL also proposed the use of other foundation systems such as rock anchors and rock socketed piers where bedrock is exposed or too shallow (Appendix C).

ATL suggested that the Project sponsor conduct a more comprehensive pre-construction investigation that would include additional soil borings, rock coring at each proposed foundation location, seismic testing and additional laboratory analysis of recovered soil and rock samples to determine the final turbine foundation design. These investigations are common pre-construction activities for wind power projects.

In the event of blasting, a preliminary blasting plan has been prepared by GZA (Appendix B). During instances where blasting is employed for the excavation of tower foundations, mitigation measures will include the development of a final blasting plan that limits off-site impacts to bedrock geology. This plan will address blast size, timing, and sequencing to focus force within the area of excavation. All necessary blasting will receive oversight by an environmental monitor, and 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. To ensure that no impacts occur to potable water sources a well survey would be conducted for potable water sources within proximity of foundations that would require blasting.

Terracon recommends a limited subsurface investigation to further evaluate the areas of concern regarding karst formations (Appendix D). Soil borings and bedrock coring is recommended at 11 turbine locations to a minimum depth of 50 feet below grade. Should these borings indicate solution cavities or low strength bedrock at a particular wind turbine location, additional borings and possibly geophysical testing would be required to estimate remedial cost or suitability of the area for wind turbine support at those locations. Additionally, observation for signs of ground subsidence would be included as part of the Project's routine maintenance activities. This pre-construction investigation, coupled with the testing proposed by ATL, will serve to mitigate potential bedrock geology impacts and ensure safety and reduced future maintenance of the facility.

3.1.3.3 Soils

Potential impacts associated with soil disturbance (erosion, sedimentation, compaction) have been minimized by siting turbines in relatively level locations and using existing roads or level areas for turbine access wherever possible. Impacts to soil resources will be further minimized by adherence to best management practices that are designed to avoid or control erosion and sedimentation, stabilize disturbed areas, and prevent the potential for spills of fuels or lubricants. For example, hay bales, silt fence, or other appropriate erosion control measures will be installed as needed around disturbed areas and stockpiled soils to minimize the potential for soil erosion during construction activities. In addition, erosion and sediment control measures will be constructed and implemented in accordance with a final Stormwater Pollution Prevention Plan (SWPPP) to be prepared and approved prior to construction as part of the State Pollution Discharge Elimination System (SPDES) General Permit for stormwater discharges from construction activity for the Project, and at a minimum will include the measures set forth in the Preliminary SWPPP provided in Appendix E. At a minimum, the final SWPPP will:

- Describe the temporary and permanent structural and vegetative measures that will be used to control erosion and sedimentation for each stage of the Project from land clearing to the finished edge.
- Provide drawings showing the location of erosion and sediment control measures.
- Provide dimensional details of proposed erosion and sediment control facilities as well as calculations used in the siting and sizing of facilities, as appropriate.
- Identify temporary erosion and sediment control facilities, which will be converted to permanent stormwater management facilities, if applicable.
- Provide an implementation schedule for staging temporary and permanent erosion and sediment control facilities.
- Provide a maintenance schedule for soil erosion and sediment control facilities and describe maintenance activities to be performed.
- Erosion and sediment control measures will be constructed prior to beginning any other land disturbances. The devices will not be removed until the disturbed land areas are stabilized.

Mitigation measures to protect and restore agricultural soils will be undertaken during and after construction, and will include full restoration of temporarily disturbed agricultural land according to NYS&M Guidelines for Agricultural Mitigation for Wind Power Projects. For example, topsoil will not be stripped and cranes will not cross fields during saturated conditions when such actions could damage agricultural soils. Existing access roads will be used for access to Project facilities to the

extent practicable. However, for any required new access roads, topsoil in the work area will be stripped and stockpiled outside the area of disturbance, but on the property from which it was removed. All vehicular movements and construction activity will be restricted to areas where topsoil has been removed. Approximately 282.5 acres of temporarily disturbed agricultural soils will be restored following construction. Restored areas will include tower sites, road edges, and staging areas. This process will generally involve the following sequence of activities:

1. Removal of gravel or other temporary fill.
2. Decompaction of compacted subsoils using a deep ripper.
3. Disking and removal of stones from decompacted subsoil.
4. Spreading of stockpiled topsoil over the decompacted subsoil, and reestablishing pre-construction contours to the extent practicable.
5. Disking and removal of stones following the spreading of topsoil.
6. Seeding and mulching topsoil. Seed selection in agricultural fields will be based on guidance provided by the landowner and the NYSA&M.

Soil impacts during construction will also be minimized by providing the contractor and all subcontractors copies of the final SWPPP and associated construction documentation and plans, which will contain all applicable soil protection, erosion control, and soil restoration measures. One or more pre-construction meetings will be held with the contractor and a representative of the NYSA&M, and during construction, the environmental monitor(s) will assure compliance with the permit requirements depicted on construction plans/documentation and soil protection measures described above and included in Appendix E.

3.2 WATER RESOURCES

The Project area is located in the Chaumont-Perch drainage basin (USGS Hydrologic Unit 04150102) of the Great Lakes Region, which ultimately drains to the Lake Ontario and the St. Lawrence River. On-site surface waters, wetlands, and groundwater resources are described below.

3.2.1 Existing Conditions

3.2.1.1 Surface Waters

The Chaumont River, Perch River, and Perch Lake are the dominant hydrologic features in the vicinity of the Project area. The Chaumont River, which intersects the northwest corner of the Project area, flows southwest into Chaumont Bay of Lake Ontario. Perch Lake and its outlet, the Perch River, lie approximately one mile southeast of the Project area. The Perch River also flows

southwest, parallel to the Chaumont River, and enters Lake Ontario at Black River Bay. Chaumont Bay and Black River Bay are approximately 4 miles and 6 miles southwest of the Project area, respectively. Lake Ontario's outlet is the St. Lawrence River, which is approximately 6 miles northwest of the Project area at the nearest point, ultimately draining into the Atlantic Ocean.

The Project area contains a number of small ponds and streams. USGS mapping indicates that the Chaumont River (and unnamed tributaries thereof), Buttermilk Creek, Three Mile Creek/Horse Creek, and unnamed tributaries to Stone Mills Creek are located within the Project area (Figure 7). Buttermilk Creek is tributary to the Chaumont River, Three Mile Creek/Horse Creek flows into Chaumont Bay, and Stone Mills Creek flows into Perch Lake. All of these streams ultimately flow southwest toward Lake Ontario. All on-site streams are classified by the NYSDEC as Class C waters, indicating that they are suitable for non-contact activities and supporting fisheries. Class C waters are not subject to regulation under the stream protection category of the Environmental Conservation Law, Article 15 (Protection of Waters).

Streams in the Project area, both named and unnamed, are primarily low-gradient drainage features that meander through wetlands, agricultural fields, and pastures. Most of these streams are less than 10 feet wide with variable substrates, and vegetative cover characteristics. Some on-site streams have well-defined and abrupt banks, while the banks of others transition into adjacent wetland vegetation, and thus are essentially indiscernible. Small farm ponds/open water areas are also interspersed throughout the Project area. Generally, they are found in open field settings, adjacent to houses and barns, or within wetlands. Water depths, although not verified, are anticipated to be 4 feet or more. They may be used as a source of water for livestock as well as for fishing and aesthetic purposes.

3.2.1.2 Wetlands

Wetlands within the Project area have been examined through aerial photography interpretation, review of state and federal wetland mapping, review of the location of mapped hydric soils, and on-site federal wetland delineation methodologies.

3.2.1.2.1 *Existing Information*

Review of NYSDEC mapping indicates that there are a number of freshwater wetlands located within river valleys in the vicinity of the Project area that are regulated under Article 24 of the Environmental Conservation Law. However, none of these wetlands are located within the Project area (see Figure 8). The nearest State-regulated wetland L-14, associated with a tributary of Stone

Mills Creek, is designated as a Class III wetland by the NYSDEC. This wetland totals 94 acres in size, none of which occurs within the Project area. State-regulated wetland complex BV-1 is also noteworthy due to its large size and adjacency to the Project area (approximately 1,600 feet away at the nearest point). This Class I wetland includes Perch Lake and a portion of the Perch River and is approximately 5,800 acres in size.

Review of National Wetland Inventory (NWI) mapping indicates that there are 96 federally mapped wetlands located within the Project area. The federally mapped wetlands are identified in Figure 8. While many of these mapped wetlands are located along streams and rivers, a number of them occur in depressional areas scattered throughout the Project area. The NWI maps indicate that emergent wetlands are the dominant wetland type within the Project area, totaling approximately 81 acres. Broad-leaved forested wetlands and broad-leaved deciduous scrub-shrub wetlands are also prevalent totaling approximately 28 acres and 26 acres, respectively. Less common wetland types (in terms of acreage within the Project area) include, but are not limited to, unconsolidated bottom impoundments (farm ponds), scrub-shrub/forested wetlands, and a riverine unconsolidated bottom wetland (i.e., the Chaumont River). Altogether, the NWI mapping indicates approximately 173 acres of wetlands located within the Project area.

A review of the National Hydric Soil List for New York State indicates that portions of the Project area contain hydric soils, as determined by the USDA Natural Resources Conservation Service (NRCS) (NRCS, 2010). Hydric soils cover approximately 14% of the Project area and are comprised of Covington silty clay, Guffin clay, Livingston mucky silty clay, Newstead silt loam, and Fluvaquents-Udifluvents complex. These soils are found in relatively narrow, linear stretches throughout the Project area (generally southwest/northeast oriented) and are commonly associated with stream channels, NWI mapped wetlands, and/or wetlands delineated or approximated by EDR. An additional 48% of the Project area contains the following soil series with potential for hydric inclusions: Chaumont, Kingsbury, and Niagara (NRCS, 1989).

3.2.1.2.2 Field Review

EDR personnel performed identification and delineation of wetlands and streams in areas proposed for wind power development during the fall of 2007 and the fall of 2010. Field surveys were conducted in limited areas within the Project area where wetland impacts were likely to occur from construction and/or operation of the Project including turbines, turbine workspaces, access roads, substation, O&M facility, potential laydown areas, public road intersections (for potential widening/improvements) and buried electrical interconnect. A wetland survey area was created for

wetland delineation fieldwork that focused on specific areas of the Project including a 200 foot corridor for the buried interconnect, 100 foot offset from the edges of access roads, a 200 foot radius for turbines, a 200 foot radius for potential existing road intersections, the proposed disturbance area of associated facilities such as the O&M Building, and the interconnect switch station (Survey Area). The Survey Area was field reviewed and wetlands within this area were delineated. This included areas outside of the current Project layout where alternative Project component locations were previously examined. However, for the purpose of this DEIS, the term Survey Area refers only to the delineated wetlands that occur in the current Project layout. EDR personnel delineated a total of 61 wetlands and 22 streams within the Survey Area. The complete wetland delineation report can be found in Appendix F.

3.2.1.2.3 *Wetland Community Types*

In general, jurisdictional wetlands delineated in the Project area exist as one or a combination of the following five types: 1) emergent wetland, 2) scrub-shrub wetland, 3) forested wetland, 4) farm ponds or 5) streams (ephemeral, intermittent and perennial). Wetland types were classified according to the Cowardin classification (Cowardin, L.M., V. Carter, F.C. Goblet and E.T. LaRoae, 1979). Wetlands and streams delineated within the Project area are depicted in Figure 9, and descriptions of each of the communities are presented below.

Emergent wetland – A total of twenty-five (25) wetlands within the Survey Area are emergent or are partially emergent. Emergent wetlands occur where surface water collects in shallow basins and/or adjacent to open water. These wetlands are characterized by more persistent and/or deeper inundation, often containing soils that remain inundated throughout the year. Although the Cowardin classification was used to classify wetlands, some of the emergent wetlands in this category could be best described according to the Reschke definition as wet meadow (Reschke, C. 1990). Wet meadow wetland areas are usually found in poorly drained, low-lying depressional areas. Wet meadows may resemble grasslands and are typically drier than other marshes, except during periods of seasonal high water. They generally lack standing water for most of the year, though snow melt, stormwater runoff, and/or a high water table allows the soil to remain saturated for a significant portion of the growing season.

Emergent wetlands identified in the Survey Area are dominated by herbaceous plants such as cattails (*Typha latifolia.*), rushes (*Juncus sp.*), wetland grasses, asters, goldenrods (*Solidago sp.*), and sedges. The soils are unsaturated but moist within 16 inches with a silt

clay texture and generally characterized by a low chroma value of 10YR 3/1 and 10YR 3/2. Evidence of oxidized root channels and morphological plant adaptations (hummocks) occur throughout the on-Site emergent wetlands.

Scrub-shrub wetland – A total of twenty-three (23) wetlands on site were found to be completely or partially scrub shrub. Scrub/shrub wetlands within the Study Area are characterized by dense stands of shrub species less than 20 feet tall, including willow (*Salix sp.*), red osier dogwood (*Cornus stolonifera*), gray dogwood (*Cornus racemosa*), and meadowsweet (*Spiraea sp.*). Herbaceous vegetation in these areas includes a mix of upland and wetland species, but is typically dominated by spotted jewelweed (*Impatiens capensis*), sensitive fern (*Onoclea sensibilis*), sedges (*Carex sp.*), canary reed grass (*Phalaris arundinacea*), wool grass (*Scirpus cyperinus*), green bulrush (*Scirpus atrovirens*), field horsetail (*Equisetum arvense*), sphagnum moss (*Sphagnum fallax*), and goldenrods (*solidago sp.*). The soils are unsaturated but moist within 16 inches with a clay texture and characterized by low chroma values of 10YR 3/1, 10YR 4/1, and 10YR 5/2. Evidence of water-stained leaves, oxidized root channels, and morphological plant adaptations (hummocks) occur throughout this wetland.

Forested wetland – Forested wetland communities are dominated by trees that are 20 feet or taller, but also include an understory of shrub and herbaceous species. The 10 forested wetlands or partially forested wetlands in the Survey Area include a mix of hydrophytic trees such as American elm (*Ulmus americana*), green ash (*Fraxinus pennsylvanica*), and red maple (*Acer rubrum*), and shrub species such as grey dogwood, red osier dogwood, meadowsweet, winterberry (*Ilex verticillata*), blackberry (*Rubus sp.*), and highbush blueberry (*Vaccinium corymbosum*). Herbaceous species include asters, wetland sedges, wetland grasses, green bulrush, wool grass, sphagnum moss, soft rush (*Juncus effusus*) and in some instances the state protected white turtlehead (*Chelone glabra*). The soils within forested wetlands have a silt loam to clay texture with a organic layer and are characterized by a low chroma value of 10YR 2/1 to 10YR 7/1. Evidence of saturated soils, watermarks, drainage patterns, oxidized root channels, water-stained leaves, and morphological plant adaptations occur throughout these wetlands.

Farm Ponds - A few small farm ponds and recreation ponds are found within the Survey Area. Generally, they are found in open field settings or adjacent to houses and barns. Typically, these ponds are excavated or diked, and range in size from 0.07 to 0.94 acre. Banks are typically well defined and emergent wetland vegetation tends to be limited or

lacking. Although not verified, water depths are expected to be consistent with excavated ponds that are used as a source of water for livestock as well as for fishing and aesthetic purposes. Such ponds are typically a minimum of 4 feet deep.

Streams – A total of 22 streams were identified in the survey area. These streams are primarily low-gradient drainage features that meander through wetlands, agricultural fields, and pastures. Most of these streams are less than 10 feet wide with variable substrates, and vegetative cover characteristics. Some on-site streams have well-defined and abrupt banks, while the banks of others transition into adjacent wetland vegetation, and thus are essentially indiscernible.

A unique aspect of wetlands identified in the Survey Area is the connectivity of these areas as they stretch across the Project area in a generally southwest/northeast direction. This connectivity is beneficial in terms of water quality improvement and wildlife habitat functions (i.e., corridors). However, some wetlands in the Survey Area may have limited functions and values due to 1) location within or adjacent to agricultural fields, 2) lack of structural diversity, and 3) past or on-going physical disturbance such as agriculture. Within the Project area, the highest-value wetlands are those contiguous systems along streams that may provide a physical buffer between surface waters and adjacent agricultural fields.

3.2.1.3 Groundwater

According to the USGS Ground Water Atlas of the United States, the Project area is located over the New York and New England Carbonate Rock Aquifer, which is a national principal aquifer (indicating that this aquifer is regionally extensive or that it has the potential to be used as a source of potable water) (USGS, 1995). According to the EPA Safe Drinking Water Information System, surrounding villages that rely on groundwater for their drinking water supply include LaFargeville, Black River, Brownville, Evans Mills, and Theresa (EPA, 2011). Of these five villages, the only health-based violation reports to the EPA were in the Villages of Evans Mills and Theresa. The violation in Evans Mills was an exceedance of chloride maximum containment, from December 2007 to December 2008. In Theresa the violations were for an exceedance of sulfate, iron, and color maximum contaminant level, the sulfate and iron occurred in 2002 and 2005, but color only occurred in 2005. The Soil Survey of Jefferson County states that ground water for domestic use is typically obtained from wells drilled into bedrock as shallow wells are subject to seasonal dryness (USDA, 1989). The Soil Survey further states that this water supply is generally of good quality although it is hard water and can be high in sulfur, iron and/or salt in some areas.

GZA submitted a Freedom of Information Law (FOIL) request letter to the NYSDEC to obtain information for water wells that may be available in or around the Project area. NYSDEC provided eight Water Well Completion Reports within and in the vicinity of the Project area in a response dated March 2007. These reports can be found in Appendix B.

3.2.2 Potential Impacts

Based upon the preliminary project layout, wetland delineation, and desktop evaluations conducted to date, an assessment of temporary and permanent impacts to wetlands and streams is presented below.

3.2.2.1 Construction

3.2.2.1.1 Surface Waters and Wetlands

To avoid or minimize the overall 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, and substation, are anticipated to avoid wetlands to the maximum extent practicable.
- Number and overall impacts due to access road crossings were minimized by routing around wetlands whenever possible and utilizing existing crossings and narrow crossing locations to the extent practicable.
- Buried electric interconnect lines will avoid crossing forested wetlands whenever possible, crossed wetlands at narrow points, and will utilize installation techniques that minimize temporary wetland impacts.

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

During construction, potential direct or indirect impacts to wetlands and surface waters may occur as a result of the installation of access roads, the upgrade of local public roads, the installation of above ground or buried electrical interconnects, and the development and use of temporary workspaces

around the turbine sites. Direct impacts, including clearing of vegetation, earthwork (excavating and grading activities), and the direct placement of fill in wetlands and surface waters, are typically associated with the development of access roads and workspaces. The construction of access roads, and possibly the upgrade of local public roads, are anticipated to result in both permanent (loss of wetland/surface water acreage) and temporary impacts to wetlands. The development and use of temporary workspaces will result in only temporary impacts to wetlands/streams. The installation of above ground or buried electrical interconnects will temporarily disturb streams and wetlands during construction as a result of clearing (brushhogging, or similar clearing method requiring no removal of rooted woody plants), and soil disturbance from burial of the electrical interconnects or from pole installation (if above ground electrical lines are required). Indirect impacts to wetlands and surface waters may result from sedimentation and erosion caused by construction activities (e.g., removal of vegetation and soil disturbance). This indirect impact may occur at wetlands adjacent to work areas where no direct wetland impacts are anticipated, including areas adjacent to proposed access road upgrade/construction, electrical interconnects, turbine sites, staging area(s), wind measurement towers, or the substation.

Based on an analysis of the proposed Project layout and the delineated wetland boundaries, approximately five acres of temporary wetland/stream soil disturbance and an additional 1/2 acre of clearing within forested wetlands are anticipated to occur due to Project construction. These impacts will involve temporary placement of fill to accommodate proposed Project access road construction and turbine work spaces, temporary soil disturbance associated with the installation of buried and overhead electrical interconnects, and clearing of forested wetlands within the ROW of the overhead electrical interconnect. No impacts to State regulated freshwater wetlands are proposed. Wetland/stream impacts associated with public roadway improvements, which may be necessary to accommodate construction activity, are not known at this time, and thus not included in the impact calculations. However, impacts that may result from public road improvements will be addressed during USACOE and/or NYSDEC wetland permitting, which will take place subsequent to this DEIS.

To further minimize impacts to wetlands and streams, trees within forested wetlands will be cleared manually and flush cut to ground level. Timber matting will be used, as needed, to access forested wetlands. Wherever feasible, buried electrical interconnects are installed co-linear with access roads to minimize disturbance to wetlands.

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

- 175-foot radius turbine workspaces will be reduced to a permanent footprint of 0.2 acre (80-foot by 40-foot gravel crane pad, 18-foot diameter turbine pedestal, and a 6-foot wide gravel skirt around the tower base).
- Access roads will be reduced to maximum drivable width of 20 feet (except where unstable soil conditions or severe erosion hazard preclude restoration).
- The 100-foot crane paths will be allowed to regenerate naturally.
- Buried electrical interconnect routes will be allowed to regenerate naturally.
- The 100-foot overhead electrical interconnect ROW will be reduced to a width of 75 feet.

Permanent impacts to surface waters and wetlands (loss of surface water/wetland acreage) will result from the footprint of permanent access roads necessary to accommodate long-term maintenance and operation activities. Other long-term impacts to wetlands will occur as a result of clearing activities (e.g. brushhogging within the overhead interconnect ROW) in forested wetlands. This activity will not result in a loss of wetland acreage, but will result in the conversion of forested wetlands to communities dominated by shrub and herbaceous vegetation (scrub-shrub/wet meadow/emergent). Based upon the proposed layout, the permanent footprint of access roads (drivable width of 20 feet wide) is anticipated to result in approximately 1/2 acre of permanent impacts to wetlands/streams, and an additional 1/2 acre from the conversion of forested wetlands to other wetland community types will occur within the 75-foot overhead interconnect ROW. No permanent impacts to NYSDEC freshwater wetlands are proposed.

3.2.2.1.2 *Groundwater*

As previously mentioned, 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 installation of concrete foundations; and
- Impacts to groundwater recharge areas (wetlands).

Installation of turbine foundations has the greatest potential for impacts to groundwater. If blasting is necessary, it can generate ground vibration, fracture bedrock, and impact groundwater levels. However, based on the anticipated minimum distance to existing structures (at least 1,250 feet) and the assumption that some private water supply wells will be located in close proximity to these structures (typically within 100 feet), it is highly unlikely that blasting (if necessary) would physically damage the individual wells or affect the groundwater flow to these wells (and subsequently the well yield) (Appendix B).

The construction process could also impact groundwater flow paths in areas where excavation (or blasting) occur below the water table. In these instances, water is anticipated to flow around the disturbance and resume its original flow direction down gradient of the disturbance. Groundwater that infiltrates into the excavation may require removal by pumping, which could have an effect on the elevation of the water table. However, this water will be pumped to the surface and allowed to infiltrate back into the water table with negligible loss of volume due to evaporation. Therefore, any effect will be very localized and temporary. Additionally, installation of the concrete foundations may 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 addition to impacts to groundwater due to turbine foundation installation, minor impacts could result from other Project activities. Construction of access roads will result in minor increases in storm water runoff that otherwise would have infiltrated into the ground at the road locations. Buried transmission lines may facilitate groundwater migration along trench backfill in areas of shallow groundwater. Construction of Project components that traverse wetlands may also have an impact on groundwater as many wetlands serve as groundwater recharge areas.

An additional potential impact to groundwater is the introduction of pollutants to groundwater from the discharge of petroleum or other chemicals used during construction. 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.

3.2.2.2 Operation

3.2.2.2.1 *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 area. Vehicular access to the turbines, substation, 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 adverse impacts. Minor and isolated incidences of impact may occur, which could have a minimal impact to surface waters or wetlands in or adjacent to the Project area, including buried electrical interconnect maintenance, access road washouts, culvert replacement/maintenance, or accidental fuel/chemical spills.

The proposed Project will not result in wide-scale conversion of land to built/impervious surfaces. Tower bases, crane pads, access roads, and the substations in total will add approximately 48.5 acres of impervious surface to the 9,450-acre Project area (i.e., conversion of approximately 0.5%). Consequently, no significant changes to the rate or volume of stormwater runoff are anticipated. However, installation of permanent Project components could result in localized changes to runoff/drainage patterns.

3.2.2.2.2 *Groundwater*

Most 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 substation will have a minimal effect on groundwater recharge. Turbine foundations installed below the water table are not anticipated to have any measurable effect on groundwater levels or flow patterns. The migration of groundwater along buried interconnect trenches could have a minor effect on groundwater flow paths, and a continued risk of chemical spills during operation/maintenance may also affect groundwater.

3.2.3 *Proposed Mitigation*

To mitigate for unavoidable permanent wetland and stream impacts as well as permanent conversion impacts (i.e. clearing of forested wetlands) associated with the Project, the Applicant will undertake a suitable on-site or off-site compensatory mitigation project, likely through the creation of in-kind wetland, at a ratio of 1.5 to 1 (mitigation to impact). This suitable compensatory mitigation project will be developed in consultation with the NYSDEC and USACOE during the Joint Application

for Permit process. In addition, the final mitigation area will include any currently undetermined wetland/stream impacts, such as those areas associated with public road improvement efforts.

No mitigation for indirect or temporary impacts to wetlands or streams is proposed, given the fact that these impacts will not result in any loss of wetland acreage. However, temporary impacts to wetlands/streams will be minimized during construction as discussed below.

The direct impacts to wetlands/streams will be minimized by utilizing existing or narrow crossing locations whenever possible. Upgrading existing crossings that are under-maintained/undersized will have a long-term beneficial effect on water quality, as it will help to keep farm equipment and other vehicles out of surface waters. Special crossing techniques, equipment restrictions, herbicide use restrictions, and erosion and sedimentation control measures will be utilized to reduce adverse impacts to water quality, surface water hydrology, and aquatic organisms. In addition, clearing of vegetation along stream banks and in wetland areas will be kept to an absolute minimum.

Where crossings of surface waters and wetlands are required, the Applicant will employ Best Management Practices associated with particular, applicable streamside and wetland activities, as recommended by the NYSDEC and the USACOE, and required by the issued wetland/waters permits. Specific mitigation measures for protecting wetlands and surface water resources will include the following:

- *No Equipment Access Areas:* Except where crossed by permitted access roads, wetlands, and streams will be designated “No Equipment Access,” thus prohibiting the use of motorized equipment in the areas.
- *Restricted Activities Area:* A buffer zone of 100 feet, referred to as “Restricted Activities Area”, will be established where Project construction traverses streams, wetlands and other bodies of water. Restrictions will include:
 - No deposition of slash within or adjacent to a waterbody;
 - No accumulation of construction debris within the area;
 - Herbicide restrictions within 100 feet of a stream or wetland (or as required per manufacturer’s instructions);
 - No degradation of stream banks;
 - No equipment washing or refueling within the area; and
 - No storage of any petroleum or chemical material.

- *Access Through Wetlands:* When crossing wetlands, routing around edges, utilizing higher ground, and crossing the narrowest portion of the wetland will be the preferred crossing options. Wherever feasible, low impact crossing methods will be used such as timber mats or similar materials. Geotextile mats, corduroy, and/or gravel may also be used to create temporary wetland road widening. Where permanent roadways are installed and impoundment of water is possible, the installation of culverts will maintain the natural water levels/flows on each side of the road.
- *Sediment and Siltation Control:* A soil erosion and sedimentation control plan will be developed and implemented as part of the SPDES General Permit for the Project. To protect surface waters, wetlands, groundwater and stormwater quality, silt fence, hay bales, and temporary siltation basins will be installed and maintained throughout Project development. Exposed soil will be seeded and/or mulched to assure that erosion and siltation is kept to a minimum along the wetland boundaries. These specific control measures are specified in the Project SWPPP included as Appendix E. The location of these features will be indicated on construction drawings and reviewed by the contractor and environmental monitor prior to construction. The environmental monitor will also inspect these features to assure that they function properly throughout the period of construction, and until completion of all restoration work (final grading and seeding).

The wetland impacts previously described will be re-evaluated during the state and federal wetland permitting process. This process will require a Joint Application for Permit filed with the NYSDEC and the USACOE, and will involve the following steps:

1. Submission of a final wetland delineation report to USACOE and NYSDEC, along with request for jurisdictional determination by these agencies.
2. Site visits by USACOE and NYSDEC representatives to both verify the boundaries of delineated wetlands and determine which wetlands are under the jurisdiction of each agency (pursuant to Section 404 of the Clean Water Act and Article 24 of the Environmental Conservation Law).
3. Evaluation of opportunities for further wetland impact avoidance and minimization through minor adjustments in the proposed location of Project components.
4. Preparation of a Joint Application for Permit, including an analysis of wetland functions and values, a description and quantification of wetland and stream impacts (temporary and permanent), an alternatives analysis, and suggested mitigation plans. Wetland mitigation will

involve in-kind replacement of all permanently impacted wetlands at a ratio of at least 1.5 to 1 (mitigation to impact).

5. USACOE and NYSDEC processing/review of the permit application, including public notice and consultation with other state and federal agencies (SHPO, EPA, USFWS).
6. Permit issuance, including conditions for wetland protection, impact minimization, mitigation, and monitoring.
7. Preparation and submittal of final wetland mitigation plans to the agencies.

To assure compliance with proposed mitigation measures during construction, the Applicant will provide the construction contractor copies of all NYSDEC (Article 24 and 15, Section 401 Water Quality Certification) and USACOE permits (Section 404), and site specific plans detailing construction methodologies, sediment and erosion control plans, and required natural resource protection measures. The Project Applicant will also employ one or more environmental monitors during construction to ensure compliance with all plans and permit conditions.

The contractor will adhere to any special conditions of permits issued by the NYSDEC and USACOE, which may include low impact stream crossing techniques, seasonal restrictions, and/or alternative stream crossing methods. Wetlands temporarily disturbed during construction will be restored to their original grade. This will allow wetland areas to regenerate naturally following construction.

Any increase in stormwater runoff will be negligible, as Project construction will result in limited addition of impervious surface. Nevertheless, specific means of avoiding or minimizing stormwater-related adverse impacts during construction and operation of the Project include adhering to a detailed soil erosion and sedimentation control plan, as described previously. Additionally, a Spill Prevention, Containment, and Countermeasure (SPCC) Plan that outlines procedures to be implemented to prevent the release of hazardous substances into the environment will be implemented. This plan will not allow refueling of construction equipment within 100 feet of any stream or wetland, and all contractors will be required to keep materials on hand to control and contain a petroleum spill. These materials will include a shovel, tank patch kit, and oil-absorbent materials. Any spills will be reported in accordance with state and/or federal regulations. Contractors will be responsible for ensuring responsible action on the part of construction personnel.

To avoid localized drainage problems, the environmental monitor will identify the need for ditches, water bars, culverts, and temporary sediment retention basins at each road and tower site prior to

the initiation of construction. If drainage problems develop during or after construction, the environmental monitor will evaluate the problem (in consultation with the contractor, landowner, and/or agency representative) and recommend a solution. The contractor will take corrective actions after receiving the recommendation.

A dewatering plan will be prepared to outline the procedure for infiltrating the pumped water back into the ground in the event that water table penetration occurs during construction. The dewatering plan will outline the required capacity and substrate of the infiltration basins as well as proposed locations of infiltration basins. If blasting is necessary for construction of any wind turbine foundations, blasting will be conducted in accordance with a blasting plan designed with appropriate charge weights and delays to localize bedrock fracturing to the proposed foundation area, minimizing the already unlikely chance of impacting water levels in residential wells. GZA prepared a preliminary blasting plan provided as part of Appendix B.

The exact location of private water supply wells within the Project area will be determined and clearly marked to avoid potential damage during construction and operation of the Project. A dewatering plan will be developed as part of the SPDES General Permit as a conservative groundwater protection measure. This plan will include specifications on the required capacity of sediment basins as well as proposed locations of the sediment basins. If blasting is necessary for construction of any wind turbine foundations, blasting will be conducted in accordance with the blasting plan as designed with appropriate charge weights and delays to localize bedrock fracturing to the proposed foundation area, minimizing the already unlikely chance of impacting water levels in residential wells. However, as previously stated, blasting is not expected to be required. As a further groundwater well mitigation measure, the Project Applicant will conduct structural, water quality, and water quantity inspections of wells, if any, occurring within 500 feet of proposed wind turbines before and after construction; however, no such wells are anticipated as the three wells identified in the NYSDEC well completion logs are all greater than 1,250 feet from any proposed turbine site, and any private wells are anticipated to be within 100 feet thereof. Any impacts identified through these inspections will be addressed on a case-by-case basis and appropriately mitigated through oversight of the environmental monitor.

Final Project design will be consistent with the NYSA&M Guidelines for Agricultural Mitigation for Wind Power Projects, to the extent practicable. Therefore, topsoil removal and decompaction will be conducted in areas where soil restoration is necessary to protect active agricultural areas. These practices will also mitigate any potential impacts that soil compaction could have on infiltration of rain and snow melt, thus preserving the existing local water table levels. For non-agricultural lands, the

construction footprint will be minimized by defining/delineating the work area in the field prior to construction, and adhering to work area limits during construction. This will limit the potential impacts of soil compression on normal infiltration rates.

3.3 BIOLOGICAL RESOURCES

3.3.1 Existing Conditions

3.3.1.1 Vegetation and Ecological Communities

General categories of terrestrial plant communities within the overall Project site were mapped based on interpretation of aerial photography and field verification. Community boundaries were then digitized, and approximate acreages calculated through the use of Geographic Information System (GIS) analysis. All identified communities within the Project site are depicted in Figure 10. The scientific names for all referenced plant species are presented in Appendix G. Inventoried wetland communities within the Project site have been mapped and described separately (see Section 3.2).

Plant species and communities found within the Project site were identified and characterized during field surveys conducted within the area of potential Project disturbance by EDR during the spring and fall of 2007, and fall of 2010. A total of 218 plant species were documented within the Project site during these surveys. A list of these species, including scientific names and federal and state status, is included in Appendix G. The majority of the plant species identified during the course of field surveys are relatively common to the region and the state, with the exception of cork (rock) elm (*Ulmus thomasi*), which is a New York State threatened species, due to Dutch elm disease. However, other State listed plant species could potentially be located within the Project site (see Section 3.3.1.1.2).

The major plant communities found within the Project site generally are common to the region and New York State. Agricultural fields, forest and shrub land are the dominant community types within the Project site, while other successional lands (old field), open water, and developed/disturbed communities occur to a lesser extent. Brief descriptions of these community types, as classified and described in Ecological Communities of New York State (Reschke, 1990), are provided below.

Agricultural Land constitutes the largest community within the Project site, with approximately 4,155 acres (44.0%) in row crops, field crops, or pastureland. Corn is the primary row crop, while other crops include soybeans, alfalfa, oats and wheat. Pastureland is used for the grazing of livestock and is typically characterized by mixed grasses and broad-leafed herbaceous species, including clovers,

plantains, and dandelion. Hayfields are typically rotated into (and out of) row crop production (typically corn and soybeans), and less often into pastureland. Consequently, the percentage in each agricultural type is continuously changing. However, within the Project site it is estimated that hayfields currently total approximately 3,270 acres, row crops 525 acres, and pastureland 360 acres.

These grass/forb dominated areas provide preferred nesting and foraging habitat for open country and grassland bird species such as bobolink, red-winged blackbird, horned lark, eastern meadowlark, northern harrier, and savannah sparrow. The vegetation in these areas provides forage in the form of seeds and foliage, which is utilized by sparrows, finches, small mammals (mice, shrews, etc.), woodchucks, whitetail deer, and eastern cottontail. Birds of prey, such as northern harrier, and mammalian predators, such as red fox and eastern coyote, also use open fields as hunting areas.

Successional Shrubland occurs on approximately 2,200 acres (23.3%) within the Project site, and is frequently associated with old fields and young forest on the periphery of agricultural areas. Shrubland areas are commonly found in poorly drained areas or fallow fields that have gone out of agricultural production. Areas of young trees and shrubs are also intermixed with some forested areas. Herbaceous species similar to those found in successional old fields occur in this community. However, shrub species such as gray dogwood, hawthorn, honeysuckle, raspberry, multiflora rose, and wild grape dominate this community. Shrub-dominated wetlands (interspersed with some upland successional shrubland) also occur on-site and were described in Section 3.2.

Shrub-dominated habitats (both wetland and upland) provide nesting and escape cover for a variety of wildlife species. Various songbirds, such as gray catbird, American goldfinch, indigo bunting, and yellow warbler, require low brushy vegetation for nesting and escape cover. Whitetail deer and eastern cottontail are also typically found in brushy edge habitat. In addition, many of the shrub species found in these areas produce fruit such as nuts, drupes, and berries that are a food source for birds and mammals such as raccoon, striped skunk, and opossum.

Forest totals approximately 1,580 acres (16.7%) of the Project site. Deciduous/mixed forests within the Project site resemble the hemlock-northern hardwood and successional northern hardwood communities described by Reschke (1990). Tree species vary based on soil conditions and moisture regime, but dominant or codominant species in most locations include white ash, basswood, red maple, eastern hemlock, yellow birch, black cherry, white pine, American beech and sugar maple. The forest understory ranges from sparse to very dense, with common species

including saplings of the overstory trees, along with hophornbeam, striped maple, brambles, and ferns such as bracken fern and wood fern.

Also included within the Forest ecological community are some conifer plantations that are located within the Project site. These plantations are stands of coniferous softwoods planted for the cultivation and harvest of timber products, or to provide wildlife habitat, soil erosion control, windbreaks, or Christmas tree production. Plantations typically occur as either a monoculture or a mixed stand with two or more codominant species, such as white spruce, Norway spruce, Scotch pine, red pine, white pine, Douglas fir, and European larch, and are typically mature stands (over 60 years old). Ground layer vegetation in the more mature plantations is sparse, and typically consists of mosses, ground pine, and various ferns.

Larger areas of contiguous woodland provide habitat for forest wildlife species such as wood thrush, veery, eastern wood pewee, red-eyed vireo, black-and-white-warbler, black-capped chickadee, great crested flycatcher, and pileated woodpecker. However, relatively few areas of contiguous forest within the Project site appear large enough to support forest interior species. Mammals that utilize forest habitat include gray squirrel, eastern chipmunk, and whitetail deer. Smaller areas of contiguous woodland are found adjacent to active agricultural fields throughout the Project site and provide habitat for forest edge species. Mature forests also have the potential to provide summer roosting habitat for several species of bats including the federally endangered Indiana bat. Forests and forest edges also provide important foraging habitat for resident and migrant bat species.

Successional Old Field constitutes approximately 1,050 acres (11.1%) of the Project site, and is defined by Reschke (1990) as “a meadow dominated by forbs and grasses that occurs on sites that have been cleared and plowed (for farming or development), and then abandoned.” This ecological community is scattered throughout the Project site, primarily in the form of abandoned agricultural fields. Species found in these areas include typical old-field grasses such as orchard grass, timothy, and perennial rye. Broad-leaved herbaceous species found in old fields include red and white clover, milkweed, thistles, burdock, asters, Canada goldenrod, and Queen Anne’s lace. Shrubs (including honeysuckle, buckthorn, gray dogwood, and various brambles) and saplings from adjacent forestland, are also typically components of this community, but represent less than 50% of total vegetative cover. Areas of emergent marsh and wet meadow that are dominated by herbaceous vegetation also occur within the Project site. These wetland communities were described in Section 3.2.

The Project site also includes approximately 455 acres (4.8%) of Disturbed/Developed land. This community is a combination of several "cultural communities" defined by Reschke (1990), and is characterized by the presence of buildings, paved areas, and lawns. It includes residential yards, farmyards, storage yards, and roads, along with the native and introduced plant species that inhabit such areas (e.g., bluegrass, goldenrod, chicory, ragweed, and queen anne's lace).

3.3.1.1.1 Significant Natural Communities/Rare Plant Species

Written requests for information regarding listed threatened and endangered plant species and unique or significant natural communities were sent to the NYS Natural Heritage Program (NHP) on December 27, 2010. According to a response from NYSDEC dated January 14, 2011, the NHP database indicates that five state-listed rare plant species, and two unique/significant natural communities have been documented adjacent to the Project site (see Appendix H for Agency Correspondence). Rare plants documented adjacent to the Project area are listed in Table 7 below.

Table 7. Documented Rare Plant Species in the Vicinity of the Project Site¹

Common Name	Scientific Name	State Status
Back's sedge	<i>Carex backii</i>	Threatened
Troublesome sedge	<i>Carex molesta</i>	Threatened
Northern wild comfrey	<i>Cynoglossum virginianum</i> var. <i>boreale</i>	Endangered
American dragonhead	<i>Dracocephalum parviflorum</i>	Endangered
Prairie smoke	<i>Geum triflorum</i>	Threatened
Long-stalked stitchwort	<i>Stellaria longipes</i> spp. <i>longipes</i>	Threatened
Rock Elm	<i>Ulmus thomasii</i>	Threatened

¹Source – NHP Correspondence dated 12/01/06 and 1/14/2011

The Chaumont Barrens are located in the Towns of Lyme and Clayton, adjacent to the Project site to the west. The Chaumont Barrens are distinguished by the presence of calcareous pavement barrens; one of the two unique/significant communities identified in the area by the NHP. This community is characterized by calcareous bedrock outcrops, and a mosaic of dry meadows, and shrubby thickets with scattered trees, occurring on shallow soils over nearly level limestone bedrock. Characteristic trees include eastern red cedar, northern white cedar, white pine, and pin-cherry. The many shrubs that occur in dense thickets include gray dogwood, downy arrowwood, meadow rose, and wild honeysuckle. The ground layer in the grass-savanna areas are quite diverse and characteristically consist of grasses, sedges and flowering meadow species such as penstemon, asters, phlox and goldenrods.

The other significant natural community identified by the NHP is limestone woodland, which also occurs within the Chaumont Barrens in the Towns of Lyme and Clayton. This area is a mixture of coniferous and deciduous forest on thin soil over limestone bedrock. There are usually several codominant trees including northern white cedar, white pine, white spruce and balsam fir. Some stands have primarily hardwoods such as eastern hop hornbeam, sugar maple, shagbark hickory and red oaks. In areas of open canopy, limestone woodlands may have a shrub understory of dogwoods, honeysuckle or buckthorns with a diverse ground layer of grasses, sedges and forbs. Both this community and the calcareous pavement barrens are considered by the NHP to be significant from a statewide perspective, and to have high ecological and conservation value.

No rare plant communities were identified during on site studies, however, cork (rock) elm, which is a New York State threatened species, was observed in one area on southwestern portion of the Project site. However, based upon the presence of suitable habitat and bedrock conditions, other State listed plant species could potentially be located within the Project site. Due to observation of cork elm on site, and the significant communities known to be present adjacent to the Project site, the Project sponsor has agreed to conduct an additional, focused rare plant/community survey, to be conducted in coordination with NYSDEC Staff. A work plan for the rare plant/community survey will be provided to NYSDEC for review and comment prior to beginning studies. If this study should identify rare or threatened plant communities, the Applicant will take such measures as may be necessary to avoid Project intrusion in to these areas, including relocating Project components and/or restricting access during Project construction or operation from these areas.

3.3.1.2 Fish and Wildlife

Fish and wildlife resources within the Project site were identified through analysis of existing data sources, reconnaissance-level habitat surveys, agency correspondence, and site-specific bird and bat studies prepared by Curry and Kerlinger, Inc., Stantec Consulting (Stantec) (formerly Woodlot Alternatives, Inc. [Woodlot]) and Western Ecosystems Technology, Inc (WEST) (see Appendix I). Documented species, including scientific names, are listed in Appendix G. Specific information regarding birds, mammals, herptifauna (reptiles and amphibians), listed threatened and endangered wildlife species, and wildlife habitat within the Project site is presented below.

3.3.1.2.1 *Birds*

To determine the type and number of bird species present within the Project site, existing data sources were consulted and on-site field surveys were conducted. Sources of existing information

included the NYS Breeding Bird Atlas (BBA), USGS Breeding Bird Survey (BBS), and the Audubon Christmas Bird Count (CBC). Data derived from these existing sources are summarized below.

Existing Data

The BBA is a comprehensive, statewide survey that indicates the distribution of breeding birds in New York State (McGowin and Corwin 2008). Each block covers an area of 5-square kilometers (km²). The turbine locations proposed for the Project occur within several survey blocks. BBA data collected between 2000 and 2005 indicate that species totals for these blocks range from 74 to 99, with a combined total of 119 unique species. The majority of the species are typical of the mixed forest, successional communities, and agricultural habitats that dominate the Project site and surrounding area. Several state-listed species were present in the 2000-2005 BBA surveys, completed within blocks encompassing the Project, including six threatened or endangered species and nine species of special concern. No federally-listed threatened or endangered species were observed.

The BBS, which is directed by the USGS, is a long-term avian monitoring program that tracks the status and distribution of North American avian populations (Sauer *et. al.*, 2008). There are four BBS survey routes (Watertown, Philadelphia, Ogdensburg, and Pulaski) within approximately 30 miles of the Project site. Survey routes are walked by volunteers during the breeding season, though not all routes are sampled each year. BBS survey data from 1966 to 2007 documented 144 species of bird likely breeding in the vicinity of the Project site. Most of the species recorded were common birds of forest, forest edge, woodland, old field, grassland, and wetland habitats. However, state-listed species were observed during these surveys but, no federally-listed threatened or endangered species were observed.

The CBC involves volunteer birders traveling prescribed routes within specific count circles that are 24 km, or 15 miles, in diameter (National Audubon Society, 2011). Every bird seen or heard within that survey area is documented. The count is conducted annually, on a single day between December 14th and January 5th. Data from the CBC are used in combination with data from other surveys, such as the BBS and BBA, to determine how bird populations are changing over time. While the BBS and BBA inform trends during the breeding season, the CBC informs long-term trends in species composition and relative abundance of birds during the over-wintering period. The Watertown Count Circle overlaps the Project site, while the center of the New Boston Count Circle is 25 miles from the nearest turbine. Over the last ten years, annual species counts on these routes ranged from 30 to 64 species, for a combined total of 138 unique species. Several species listed by

the state of NY as threatened, endangered, or special concern were observed during the CBCs between 2000 and 2010. No federally-listed threatened or endangered species were observed.

In summary, the BBA, BBS, and CBC data indicate that the Project site and surrounding area have a diverse bird community, with several state-listed species present, including grassland species that nest (or forage) in fallow fields, meadows, pastures, successional shrubland, and hay and alfalfa fields. Twenty-three of the 39 listed bird species in New York State (over half the state list) were recorded in the 2000-2005 BBA and BBS. However, only eight are state-listed threatened or endangered species. The remaining are listed as species of special concern. The majority of the state-listed species recorded in the region are listed due to historic declines in habitat, particularly grassland birds, as discussed farm fields in the region return to the historic forested character of the area. (McGowan et al., 2008, Lazazzero et al. 2006).

As mentioned previously, written requests for listed species documentation were sent to the NHP to assess the potential presence of state- and/or federally-listed threatened and endangered species. According to the response from the NYSDEC dated January 14, 2011, the NHP database indicates the occurrence [15 records] of listed bird species and bird (waterfowl and raptor) concentration areas within 10 miles of the Project site, and [six records] of listed birds species within or adjacent to the Project site. As requested by NHP personnel, the exact location of these occurrences, as set forth in the database, are not provided in this DEIS. Most of the listed species were also identified by the BBA, BBS, and CBC, as well as during on-site surveys. A summary of all these listed species, and their New York legal status, are presented in Table 8, below.

Table 8. Documented State-listed Wildlife Species in the Vicinity of the Project Site¹

Common Name	Scientific Name	NYS Legal Status
Birds		
Short-eared Owl	<i>Asio flammeus</i>	Endangered
Loggerhead Shrike	<i>Lanius ludovicianus</i>	Endangered
Pergrine Falcon	<i>Falco pergrinus</i>	Endangered
Golden Eagle	<i>Aquila chrysaetos</i>	Endangered
Northern Harrier	<i>Circus cyaneus</i>	Threatened
Upland Sandpiper	<i>Bartramia longicauda</i>	Threatened
Pied-billed Grebe	<i>Podilymbus podiceps</i>	Threatened
Sedge Wren	<i>Cistothorus platensis</i>	Threatened
Least Bittern	<i>Ixobrychus exilis</i>	Threatened
Henslow's Sparrow	<i>Ammodramus henslowii</i>	Threatened
Bald Eagle	<i>Haliaeetus leucocephalus</i>	Threatened
Red-Shouldered Hawk	<i>Buteo lineatus</i>	Special Concern
Black Tern	<i>Chlidonias niger</i>	Endangered

Common Name	Scientific Name	NYS Legal Status
Common Tern	<i>Sterna hirundo</i>	Threatened
Cooper's Hawk	<i>Accipiter cooperii</i>	Special Concern
Sharp-shinned Hawk	<i>Accipiter striatus</i>	Special Concern
Common Nighthawk	<i>Chordeiles minor</i>	Special Concern
Yellow-breasted Chat	<i>Icteria virens</i>	Special Concern
Grasshopper Sparrow	<i>Ammodramus savannarum</i>	Special Concern
Horned Lark	<i>Eremophila alpestris</i>	Special Concern
Common Loon	<i>Gavia immer</i>	Special Concern
Vesper Sparrow	<i>Poocetes gramineus</i>	Special Concern
Northern Goshawk	<i>Accipiter getilis</i>	Special Concern
Golden-winged Warbler	<i>Vermivora chrysoptera</i>	Special Concern
American Bittern	<i>Botaurus lentiginosus</i>	Special Concern
Osprey	<i>Pandion haliaetus</i>	Special Concern
Whip-Poor-Will	<i>Caprimulgus vociferous</i>	Special Concern
Cerulean Warbler	<i>Dendroica cerulean</i>	Special Concern
Red-headed woodpecker	<i>Melanerpes erythrocephalus</i>	Special Concern

¹Source: BBA, BBS, Agency Correspondence, and On-site Surveys

²Also federal status

Wildlife Management Areas

The Project site is also located in the vicinity of a number of wildlife management areas (WMA's) that are owned by New York State and managed by the NYSDEC. Their purpose is to provide permanent public access to lands for the protection and promotion of fish and wildlife resources. WMA's in the vicinity of the proposed Project are managed primarily for the production of waterfowl and other wetland species. The following major WMA's are located in Jefferson County near the Project site:

- Perch River: 7,862 acres of upland and wetland habitat, located adjacent to the Project site to the southeast (approximately 0.25 mile). The most significant marsh and open water habitats in the vicinity of the Project area occur in the adjacent Perch River WMA.
- Dexter Marsh: 1,339 acres of wetland habitat, located 5 miles to the southwest
- French Creek: 2,265 acres of upland and wetland habitat, located 5.5 miles to the northwest.
- Ashland Flats: 2,037 acres of upland and wetland habitat, located 6 miles to the west.
- Indian River: 968 acres of upland and wetland habitat, located 11 miles to the northeast.

Important Bird Areas

According to the New York State Audubon, 136 IBA's have been designated in New York State, including six in Jefferson County (www.iba.audubon.org). Approximately 7,239 acres of the 9,450-acre Project area are located within portions of the Perch River Complex IBA (centered in the east-

central section of the proposed wind farm). Nearby IBA's include the Upper St. Lawrence River IBA (5.36 miles from Project area; designated for winter waterfowl), the Point Peninsula IBA (7.63 miles from the Project area; designated for raptors), the Fort Drum Grasslands IBA (8.55 miles from the Project area; designated for grassland birds), the Indian River/Blake Lakes IBA (10.09 miles from the Project area; designated for habitat for grassland and shrub birds).

In summary, based on the location and nature of the closest IBA's, the proposed Project site is located in a region with important grassland bird communities, waterbird breeding communities, waterbird migration and raptor mitigation sites. The Project site itself is situated in an area recognized for its grassland bird habitat. While the Project site lacks significant waterbird habitat, quality waterbird habitat is located nearby. Field survey data collected at the Project does not indicate large on-site concentrations of waterbirds during migration or over-winter periods.

Project Area Field Surveys

Information gathered from the existing data sources referenced above, led the Applicant to conduct several on-site field surveys. These surveys, listed in Table 9 below and provided in Appendix I, were conducted according to protocols prepared in consultation with NYSDEC staff. Additionally, as part of an Article 11 proceeding with the NYSDEC, over-winter raptor and short-eared owl surveys are being conducted by WEST. These surveys commenced on November 15, 2010 and are scheduled to be completed by March 15, 2011.

Table 9. Completed On-Site Bird Surveys

Title of Field Survey Report	Author of Field Survey Report	Date Of Report	Methodology	Date of field work
Phase I Avian Risk Assessment	Curry & Kerlinger, L.L.C.	April 2005	Automobile and Walking tour of the Site Area	November 2004
A Spring 2005 Radar, Visual, and Acoustic Survey of Bird and Bat Migration	Woodlot Alternatives, Inc.	September 2005	10 Days Visual Observation for Raptors. 36 Nights of Radar Surveys	Spring 2005
A Fall 2005 Radar, Visual, and Acoustic Survey of Bird and Bat Migration	Woodlot Alternatives, Inc.	November 2005	11 Days Visual Observation for Raptors. 37 Night s of Radar Surveys	Fall 2005
Summer 2005 Breeding Birds Surveys	Woodlot Alternatives, Inc.	November 2005	Modeled after the U.S. Fish and Wildlife Service BBS. 40 Point Counts were surveyed.	June 2005
2006 Rare Bird Survey	Woodlot Alternatives, Inc.	September 2006	Observation of known locations of Rare Birds and associated Habitat. 28 Point Counts for Breeding Bird Survey.	April – June 2006

Title of Field Survey Report	Author of Field Survey Report	Date Of Report	Methodology	Date of field work
2007 Breeding Bird and Rare Bird Survey	Stantec Consulting, formerly Woodlot Alternatives, Inc.	February 2008	Observation of known locations of Rare Birds and associated Habitat. 30 Point Counts for Breeding Bird Survey.	May-July 2007
Raptor Survey Report	Stantec Consulting.	December 2008	Visual Surveys based on Hawk Migration Association of North America methods	October 2007-May 2008

Based on the results of these investigations, it appears that over 200 different bird species could use the Project site at some time throughout a given year. The majority of the bird species, are common to New York State. However, a number of rare bird species (State listed threatened or endangered or species of special concern) were also identified during on-site surveys. Table 10 below lists and quantifies the number of rare bird species observed during the various studies conducted on-site. Fifty-two percent (198) of rare birds were observed during surveys completed during spring and fall migration periods. These observations were largely comprised of migrants overflying the Project, particularly northern harriers (97) and sharp-shinned hawk (47). Species present during the breeding season included threatened and endangered species which are likely or confirmed to be breeding in the Project area including Henslow's sparrow, upland sandpiper, northern harrier, and short-eared owl, in addition to two species of special concern, grasshopper sparrow and vesper sparrow. Although not documented during on-site surveys, sedge wren (State listed threatened), was documented during wildlife surveys completed at the nearby St. Lawrence Wind project site (in Cape Vincent; WEST 2007 and WEST 2010), and potentially suitable nesting habitat is present at the Project site. Based on this information, sedge wren may occur during the summer breeding season at the Project or transient the Project during spring or fall migration seasons.

Table 10. Observations of Rare Bird Species by Stantec/Woodlot

Common Name	Species	State Protected Designation	Survey Type					Total # Observations	
			Breeding Bird Point Counts	Rare Bird Area Searches	Spring Raptor Surveys	Fall Raptor Surveys	Winter Raptor Surveys		Incidental Observations
bald eagle	<i>Haliaeetus leucocephalus</i>	State Threatened			7	5		12	
barn owl ¹	<i>Tyto alba</i>	State Protected	1					1	
black tern	<i>Chlidonias niger</i>	State Endangered		4				4	
cerulean warbler	<i>Dendroica cerulea</i>	State Special Concern	2					2	
common tern	<i>Sterna hirundo</i>	State Threatened		1				1	
Cooper's hawk	<i>Accipiter cooperii</i>	State Special Concern			1	7	4	12	
golden eagle	<i>Aquila chrysaetos</i>	State Endangered			3	1		4	
grasshopper sparrow	<i>Ammodramus savannarum</i>	State Special Concern	35	5			5	45	
Henslow's sparrow	<i>Ammodramus henslowii</i>	State Threatened	15	2			5	22	
northern goshawk	<i>Accipiter gentilis</i>	State Special Concern				1		1	
northern harrier	<i>Circus cyaneus</i>	State Threatened	21	21	66	31	1	11	151
osprey	<i>Pandion haliaetus</i>	State Special Concern		3	11	7			21
peregrine falcon	<i>Falco peregrinus</i>	State Endangered	1		2	5			8
red-shouldered hawk	<i>Buteo lineatus</i>	State Special Concern			3				3
sharp-shinned hawk	<i>Accipiter striatus</i>	State Special Concern		2	27	20			49
short-eared owl	<i>Asio flammeus</i>	State Endangered	1	3				2	6
upland sandpiper	<i>Bartramia longicauda</i>	State Threatened	14	13				5	32
vesper sparrow	<i>Poocetes gramineus</i>	State Special Concern	4		1			1	6
	# Species		9	9	9	8	2	6	18
Total # Observations			94	54	121	77	5	29	380

Breeding Birds

The objective of on-site breeding bird studies was to characterize the abundance and diversity of nesting bird species in the vicinity of the Project site, and provide a baseline record of the area's breeding avifauna. Results of the breeding bird surveys performed by Woodlot/Stantec indicate that breeding birds on and adjacent to the Project site are mainly those that utilize open and wooded upland habitats, including a noteworthy grassland bird community. The field habitat had the greatest species richness and highest number of unique species. Forested parcels and grasslands within the study area also displayed good bird diversity. A total of 67 species were documented during the surveys. The most frequently observed common species were red-winged blackbird, yellow warbler, and American robin.

Rare bird surveys were conducted by Stantec/Woodlot in 2006 and 2007, to determine the presence of five targeted species that, based upon habitat, could potentially use the Project site during breeding season. These species include short-eared owl; upland sandpiper; and Henslow's sparrow, northern harrier, vesper sparrow and grasshopper sparrow. The goal of the survey was to determine the overall number of nesting pairs of each of these species, and to collect site-specific habitat use information and other incidental bird observations.

Short-eared owls were observed in only one locality in the Project area during the rare bird survey, which was the same area where a pair of owls was observed during the breeding bird survey in 2005. The old-field habitat where the observations were made was searched but no nest was found. However, based on the history and type of observations made during the two years of surveys in the Project area, it seems likely that one to two pairs of short-eared owls could be nesting within or in the vicinity of the Project site (Stantec, 2008). In addition, a survey designed to estimate the extent of use of the Project area by short-eared owls during the over-winter (November 15-March 15) period is currently underway. Preliminary results from the surveys indicate that several short-eared owls were present within portions of the Project during some weekly surveys completed between November 15, 2010 and January 1, 2011. The complete results of this survey will be provided in the FEIS.

Twenty-seven upland sandpipers were documented during both the rare bird survey and the general breeding bird survey. Observations of this species were made throughout the Project area, although they were grouped in several areas. During April and May surveys, upland sandpipers were observed in aerial courtship displays over their territories. During June surveys, most of their activity was based on the ground where the pairs were observed foraging for food together. Most upland sandpiper observations occurred in open grasslands with little weeds or shrubs. Active searches for

nest sites for this species were not conducted, but it was obvious that nesting occurs in the Project area. Based on the location and timing of the observations, it is estimated that at least 8 to 10 pairs of upland sandpipers could be breeding in the Project area (Stantec, 2008)

Seventeen Henslow's sparrows were documented during both the rare bird survey and the breeding bird survey point counts. This species was widely distributed throughout the Project area, but confined within a specific habitat type. They were often found in fields where other grassland sparrows, such as grasshopper sparrows and savannah sparrows, occurred. Henslow's sparrows were generally found in tall grasslands intermixed with tall weeds and they were not detected in active agricultural or hayfield habitats. Based on survey results, the population size in the Project area was determined to be at least 15 to 20 pairs (Stantec, 2008).

Grasshopper sparrow was the most frequently observed (40) rare grassland bird species throughout the Project area during the breeding and rare bird field surveys. Typically they inhabit tall grasslands with occasional bare spots, but with few shrubs. This habitat is generally associated with hayfields or tall grass meadows within the Project area. Of the targeted species, grasshopper sparrows appear to be common throughout the Project area and surrounding region. Based on the location and timing of observations, it is estimated that a minimum of 40 to 50 pairs breed within the Project area (Stantec, 2008).

A total of 42 northern harriers were observed during 2007 breeding bird and 2008 rare bird surveys. Northern harriers were observed at 11 different locations during the 2007 surveys. It is estimated that approximately 8 to 10 pairs nest within or very near the Project area (Stantec, 2008). Three harrier nest sites were actually found during the 2006 surveys (although none were documented during 2007). One nest site was located within the Project site, while the other two were located just outside the Project area boundary. The two pairs nesting outside the Project area were believed to hunt within the boundaries of the Project area (Stantec, 2008). All nests were in typical nesting habitat for this species, namely old field and wetland habitat with tall herbaceous vegetation and sporadic shrubs.

Migrating Raptors

The Derby Hill hawk watch (located approximately 75 miles northwest along the Lake Ontario shore) is the closest major migration site to the Project site and is considered a significant hawk watch (Zalles and Bildstein, 2000). According to the Phase I ARA, and based on data collected during field surveys, the highly concentrated hawk migration that occurs during spring migration at Derby Hill is associated with that site's proximity to the Lake Ontario shoreline, and thus not likely to be indicative

of the numbers of hawks migrating over the Project area. Please refer to the Phase I ARA found in Appendix I for further analysis.

To provide additional site-specific data, Woodlot conducted on-site raptor migration surveys in late March to early May, 2005, between September 9 and October 16, 2005, between mid-October and mid-December 2007, and from mid-March to mid-May 2008 with the intent of documenting the characteristics of raptor migration in the area, including species, abundance, approximate flight height, general direction and flight path, and other notable behaviors. A total of 41 surveys were conducted over this period.

A total of 700 raptors, representing 14 species, were observed during the spring 2005 study. Fall raptor migration surveys in 2005 identified a total of 575 raptors, representing 13 species. The fall 2007 surveys identified 65 raptors representing nine species. A total of 225 raptors, representing ten species, were observed during the spring 2008 study. A total of 15 different species were identified during these four surveys. Additional information on observation rate can be found in each report in Appendix I.

Of the observed species, golden eagles and peregrine falcon are listed as endangered in New York, and northern harriers and bald eagles, are listed as threatened. State-listed species of special concern observed on-site include ospreys, red-shouldered hawks, sharp-shinned hawks, and Cooper's hawks. No federally-listed species were observed during the on-site surveys. See Table 10 above.

Flight heights were categorized as either below or above 150 meters (492 feet), which equates to the maximum height of the proposed turbine blades. Overall, 61% of the observed raptors were estimated to be flying lower than 150 meters. However, differences in flight altitudes between species were observed. Some species assemblages, such as the accipiters, vultures, and falcons, were consistently observed flying lower than 150 meters (492 feet). In fact, all of the falcons observed were flying below this height. Exceptions to this low-flying trend included broad-winged and red-tailed hawks, of which 58% and 41%, respectively, were flying less than 150 meters above the ground. Overall, no species flew predominately above the 150 meters threshold, while several species concentrated below 150 meters.

When compared to other raptor studies conducted for proposed wind projects such as St. Lawrence Windpower Project in nearby Cape Vincent, raptor migration rates observed at the Project were relatively low. During spring 2006 raptor surveys conducted at the St. Lawrence Wind site, the

number of individuals recorded during 12 surveys at four locations totaled 91 raptors of nine species. Thirty surveys were conducted in Fall 2006, totaling 288 raptors of nine species. In spring 2007, 21 additional raptor surveys were conducted totaling 232 raptors of eight species (West, 2007).

Nocturnal Migrants

In the spring and fall of 2005, Woodlot conducted nocturnal radar surveys to characterize the nocturnal migration of songbirds and bats. The spring study included data on passage rates, flight altitude, percent of targets flying within the radar survey area (RSA), and flight direction. Passage rates ranged from 71 avian targets/kilometer/hour (t/km/hr) to 1,769 t/km/hr, for an overall mean passage rate of 450 t/km/hr for the entire survey period. The average nightly flight altitude of avian targets ranged from 199 meters (653 feet) to 753 meters (2,470 feet), for a mean flight altitude of 443 meters (1,453 feet). The seasonal average percentage of avian targets flying below 150 meters was 14% (see the Report in Appendix I for additional information). Based upon the data collected, avian migration during the spring 2005 survey was characterized as broad front, and in general, the flight direction was to the north-northeast.

Like the spring study, the fall 2005 study collected data on passage rates, flight altitude, percent of targets flying within the rotor-swept area, and flight direction. Fall passage rates ranged from 83 t/km/hr to 877 t/km/hr, with an overall passage rate of 418 t/km/hr for the entire study period. The average nightly flight altitude of avian targets ranged from 305 meters (1,001 feet) to 663 meters (2,175 feet), for a mean flight altitude of 475 meters (1,558 feet). The seasonal average percentage of avian targets flying below 150 meters was 10%. Based upon the data collected, avian migration during the fall 2005 survey was characterized as broad front, and in general, the flight direction was to the south-southeast.

The mean passage rate observed was within the range of spring passage rates observed during similar nocturnal migration studies completed in New York and the region. For example, during spring 2006 raptor surveys conducted at the nearby St. Lawrence Wind and Cape Vincent wind sites, the overall mean passage rates were 346 and 345 t/km/hr during fall 2006 surveys, respectively, and 166 t/km/hr at both sites during spring 2007 (West, 2007 and Young et al, 2007). Mean passage rates observed at the Noble Bliss wind site in Allegheny County were 444 t/km/hr during fall 2005 and as high as 1081 t/km/hr at the Ripley-Westfield site in Chautauqua County during spring 2008 (NYSDEC unpublished data). Observed flight directions were predominantly southwest during fall surveys and northeast during spring surveys at St. Lawrence and Cape Vincent. (West, 2007 and Young et al, 2007).

Waterbirds

The Phase I ARA report suggests that the Project area itself contains little suitable nesting habitat for waterbirds. This habitat is limited mainly to small ponds and willow thickets. However, high quality waterbird habitat is located adjacent to the Project site in the Perch River Wildlife Management Area (WMA). The Perch River WMA is approximately 8,000 acres and is approximately 1.3 miles to the south of the site. According to the website of the Bird Conservation Area Sites in New York State (see <http://www.dec.ny.gov/animals/27077.html>), the following state-listed waterbirds have been recorded at Perch River both in spring and fall migration: the endangered black tern, the threatened pied-billed grebe and least bittern, and the special-concern osprey and American bittern. Ducks and geese are also well represented during migration at Perch River. A migrating waterbird survey was not included as part of on-site bird surveys due to the lack of waterfowl habitat within the Project area. However, during on-site bird surveys approximately 20-35 transient waterfowl were incidentally observed (personal comm. with T. Peterson, Stantec, 2011).

Most migrating waterbirds fly at night (and to a lesser extent during daytime) at altitudes of 500 to 1,000 feet or more (Bellrose, 1976). This phenomenon has been confirmed with radar at many locations for ducks, geese, loons, and other birds (Kerlinger 1982, reviewed by Kerlinger and Moore 1989). But, with the proximity of Perch River WMA, Lake Ontario, and the St. Lawrence River, it is likely that significant numbers of waterbirds will be in the region during migration. These will include migrating snow geese and Canada geese that feed in corn and other agricultural fields. This type of agricultural habitat occurs on the Project site and geese have been observed foraging within the site (Kerlinger and Guarnaccia, 2005). As previously mentioned a migrating waterbird survey was not included as part of on-site bird surveys due to the lack of waterfowl habitat within the Project area.

Small wetlands also occur within the Project area, some of which will attract small numbers of migrating waterbirds including rails, bitterns, waterfowl, and, perhaps, some grebes. However, because these wetlands are small, and because larger, more productive wetlands are located immediately outside of the site, the relative importance of the wetlands within the Project site is likely to be small (Kerlinger and Guaruaccia, 2005).

Wintering Birds

The Project site is also located about 15 miles east (measured to the closest turbine) of Cape Vincent, where Lake Ontario and the St. Lawrence River meet. Chaumont Bay on Lake Ontario is 4.5 miles southwest of the Project site. The St. Lawrence is about 7.5 miles northwest. Various marshes and bays on Lake Ontario and the St. Lawrence River have been identified by the New York Natural Heritage Program (NHP) as waterfowl winter concentration areas (See Agency

Correspondence in Appendix H). These include Dexter Marsh, Lake of the Isles, Eel Bay, Delaney Bay Marsh, the Grindstone Island Wetlands, Flynn Bay Marsh, and McRae Bay Marsh, all of which are within 10 miles of the Project site.

The Phase I ARA suggests that a much lower diversity and density of birds is to be expected in and around the Project site during winter than at other times of the year. Some information on the regional over-winter bird community is available from the CBC and NYSDEC survey data, as reported in the Phase I ARA report. No federally-listed endangered species were documented in the area by the CBC. There were two state-listed endangered species and three state-listed threatened species recorded in the CBC's. Of these, pied-billed grebe (threatened) will not be found on the Project site itself due to a lack of suitable habitat, but it may occur in the Perch River WMA before it freezes over. Peregrine falcon (endangered) and bald eagle (threatened) are unlikely to be found on the Project site, as they do not generally forage in upland farm fields during winter. Nevertheless, they may be drawn to the Perch River WMA when it still has open water. Golden eagle (threatened) may forage at times on or near the Project site. Short-eared owl (endangered) and northern harrier (threatened) do forage in open farm fields during winter, because of its low elevation and the moderating influence of Lake Ontario on the region's climate.

Stantec conducted winter raptor surveys from January to March 2008. A total of 68 raptors were observed, representing five different species. Of the observed species, only the northern harrier is listed as threatened in New York and the Cooper's hawk is listed as a species of special concern. In conjunction with the winter raptor surveys, short-eared owl surveys were conducted. Although suitable habitat was present, no wintering short-eared owls were observed. This study is provided in Appendix I. As stated earlier, over-wintering diurnal raptor and short-eared owl surveys are currently being conducted to determine species composition and use estimates within the Project site. These surveys have been initiated based on requests made by the NYSDEC in October 2010 and were primarily designed to collect data on state-listed species, although information on all birds documented in the field will be reported. Survey protocols for the over-winter raptor and Short-eared owl surveys currently underway were designed in consultation with NYSDEC Region 6 (see study plan is included in Appendix I).

Preliminary results from the 2010 to 2011 overwintering surveys indicate that small numbers of short-eared owls were present during some weeks between November 15, 2010 and January 1, 2011. Northern harriers were present in declining numbers from the start of surveys in mid-November 2010 to January 1, 2011. Northern harriers appeared to be using portions of the Project

as stopover habitat during late fall migration but few individuals were sighted during surveys completed in December 2010.

3.3.1.2.2 Bats

Bats that occur within the Project area include resident species as well as migrants. Resident species hibernate in caves (hibernacula) during the winter, while migrants relocate to the south. Known hibernacula occur in the Watertown area, approximately 10 miles from the Project site. Bat species with the potential to occur within the Project area are listed in Table 11.

Table 11. Bat Species with the Potential to Occur within the Horse Creek Wind Project

Common Name	Scientific Name
Northern long-eared myotis	<i>Myotis septentrionalis</i>
Eastern small footed myotis	<i>Myotis leibii</i>
Indiana bat	<i>Myotis sodalis</i>
Tri-colored bat	<i>Perimyotis subflavus</i>
Eastern red bat	<i>Lasiurus borealis</i>
Little brown bat	<i>Myotis lucifugus</i>
Big brown bat	<i>Eptesicus fuscus</i>
Silver-haired bat	<i>Lasionycteris noctivagans</i>
Hoary bat	<i>Lasiurus cinereus</i>

Source: Data from Harvey et al. (1999) and Bat Conservation International (www.batcon.org/).

Populations of cave-hibernating bats in the northeastern U.S. are experiencing unprecedented mortality due to a disease condition identified as “white-nose syndrome” (WNS). The name derives from a white, fungus that accumulates on the muzzles, ears, wings, and occasionally on other body parts of infected bats. WNS was first documented in eastern New York State during the winter of 2006, and quickly spread to Vermont, Massachusetts, and Connecticut. By May 2010, WNS has been confirmed in hibernacula in New Hampshire, New Jersey, Pennsylvania, Maryland, Virginia, West Virginia, Tennessee, Missouri, Oklahoma, Quebec, and Ontario (BCM, 2010; USFWS, 2010a; USGS, 2010b).

WNS impacts bats through at least two different mechanisms. During hibernation, infected bats rouse from torpor more frequently than uninfected bats, prematurely depleting fat reserves. These bats either die of starvation in their hibernacula or leave their hibernacula to search for food and perish in a winter landscape devoid of flying insects (Reichard & Kunz, 2009; USGS, 2010b). The second pathway for WNS impact is scarring and necrosis of wing membranes on WNS-affected bats that survive hibernation. Damaged wings could compromise maneuverability and foraging success,

which in turn would compromise reproduction and survival (Reichard & Kunz, 2009). Mortality estimates range from 75% to 100% in affected hibernacula in New York.

Bat species known to be affected by WNS that occur in the Project area include the little brown bat, northern long-eared bat, Indiana bat, eastern small-footed bat, tri-colored bat (formerly named eastern pipistrelle), and big brown bat. The current and future status of these species is uncertain. Until additional data are collected and analyzed, the abundance, distribution, and future status of these bat species in the Project area, and in the Northeast in general, remains uncertain. It may take years before the consequences of WNS to regional bat populations, either in the short- or long-term, can be fully appreciated.

To characterize and document bat activity within the Project area, Woodlot conducted acoustic bat monitoring during the spring and fall of 2005 (Appendix I), according to study protocols developed in consultation with NYSDEC. The acoustic bat studies were conducted through the use of stationary (passive) Anabat II acoustic detectors, which record the bats vocalizations. During the sampling period, a total of 67 bat call sequences were detected and recorded. This results in detection rates of 1.6 calls/night of survey and 0.9 calls/detector-night. Of the total bat passages detected while high and low bat detectors were operating simultaneously, 55 (83%) were detected by the high bat detector. Bats were detected between May 5 and May 28, with the peak passage rates occurring on May 6, when 15 call sequences were detected. In comparison to other proposed wind projects such as St. Lawrence Wind, this is a relatively low level of bat activity. During spring 2006 nocturnal Anabat surveys conducted at the St. Lawrence Wind site, the number of calls recorded ranged between 19.72 and 32.58 calls/night between 11 and 39 days of sampling (WEST, 2007). Of the 67-recorded calls at the Project site, the majority were identified as big brown bat (27), silver-haired bat (18), and *Myotis* sp. (12). Woodlot did not attempt to differentiate between species within the genus *Myotis*, which includes the state and federally endangered Indiana bat (*Myotis sodalis*). However, most of the *Myotis* calls that were detected at the Project site were between 40 and 60 kHz, which is somewhat lower than the frequency of Indiana bat calls, and most closely resembled the call signature of the little brown bat.

The fall bat survey included the deployment of two Anabat detectors on 33 nights between August 19 and September 20, 2005. During the fall study, a total of 154 bat call sequences were recorded for an overall detection rate of 4.7 calls/detector night over the course of the study. Again, as a comparison, call frequencies of between 9.26 and 32.58 calls/night were documented at the St. Lawrence Wind site (WEST, 2007). Of the 154 calls recorded at the Project site, 124 were categorized to either genus or species. Approximately 63% of these were identified as species

within the genus *Myotis*. Following these were calls of the big brown bat (19 calls), eastern red bat (4 calls), silver-haired bat (3 calls), and eastern pipistrelle (1 call). Thirty of the recorded vocalizations were unidentifiable, and therefore classified as unknown.

The NHP database indicates the occurrence of [seven] records of state and federally-listed endangered Indiana bat, the state listed eastern small-footed bat, and bat colonies within 40 miles of the Project site (NHP, 2011). Jefferson County is one of six counties in New York known to contain at least one Indiana bat hibernaculum. The nearest of these is located near Brownville, 10+ miles south of the Project site.

In 2005, the NYSDEC conducted a radio telemetry study of Indiana bats in another Jefferson County hibernaculum (Glen Park Cave), in Watertown. That work documented that a number of dispersing Indiana bats flew north, including several individuals that traveled to and resided in and near the Project area. Based on these results, Atlantic Wind retained Woodlot to further investigate the occurrence of Indiana bats within the Project area in 2006. The goal of the investigation was to collect additional data on the habitat use, distribution, and duration of residency of Indiana bats within the Project area. Field efforts focused on the forest stand within the Project area that received the heaviest use by radio-tagged Indiana bats in 2005 (Woodlot, 2006). The survey consisted of mist-netting near and around known roost trees and radio-tagging Indiana bats to document their roosting locations, follow their movement to other portions of the Project area, and examine patterns in their habitat use at night.

Mist-netting conducted between April and August 2006 resulted in a total of 56 captures (Woodlot, 2006). Indiana bats were the most commonly captured species (17 captures), followed by big brown bats (15 captures), northern long-eared bats (12 captures), and little brown bats (9 captures). Two eastern red bats were captured and one bat escaped prior to identification. Thirteen Indiana bats were fitted with radio transmitters. All tagged bats were tracked to their respective roost trees, and seventeen roost trees were found within the Project area. Active radio-tracking (near the end of the survey period) was conducted on three bats captured and radio-tagged at the end of July. These bats were radio-tracked nightly for 7 to 12 days until the end of the transmitter life of dispersal from the Project.

This study documented that Indiana bats use the same roosting area from year to year, a sign of roost fidelity (Gumbert et al., 2002). In general, radio-tracked bats used foraging areas near their respective roost sites. Average distance from diurnal roost to foraging grounds ranged from approximately 600 feet to approximately 1.2 miles, with a maximum distance of almost 1.8 miles.

The average foraging range size was approximately 265 acres. This is generally consistent with other published ranges and flight distances for this species. The area to the south of the Project site where most bats were tracked was predominantly wetland and consisted of forested and shrub wetlands and reverting old fields associated with Horse Creek and the Perch River WMA. The area to the north of the Project site was mostly grasslands and active agricultural fields, which generally represents less suitable habitat for Indiana bats. However, some telemetry locations fell within active fields.

Habitat use was generally consistent with other published habitat use studies (Rommé *et al.*, 1995; USFWS, 1999; Menzel *et al.*, 2005; Brack 2006). Indiana bats foraged more frequently in forested environments than in active agricultural landscapes, although they also used forest/field edges, forested wetlands, and agricultural mosaics of old fields/grasslands during foraging and roosting. The home range size and apparent habitat use documented during the study was generally very consistent with patterns documented by other researchers. In general, Indiana bat habitat use was most commonly associated with upland forest, wet forests, and open-canopied old fields. Nightly foraging areas used typically included a water body, most commonly Horse Creek. While bats were tracked up to 7 km (4.4 miles) away from their roost tree on any given night, nightly dispersal was typically much less than that and nightly use tended to be concentrated in the immediate vicinity of the forested stand that included the roost tree.

3.3.1.2.3 *Other Mammals*

Due to a lack of existing data regarding mammals within the Project site, (with the exception of bats) EDR documented the occurrence of mammalian species entirely through evaluation of available habitat data, species range, and incidental observation during on-site fieldwork. This effort suggests that at least 35 common species of mammal could occur in this area, including whitetail deer, eastern cottontail, eastern chipmunk, coyote, red fox, raccoon, opossum, woodchuck, gray squirrel, striped skunk, beaver, muskrat, mink, weasels, and a variety of small mammals (mice and shrews). Most of the mammal species likely to occur in the area are common and widely distributed throughout New York State. Correspondence from the NHP did not indicate any state or federally-listed mammal species, other than the bats previously discussed.

3.3.1.2.4 *Reptiles, Amphibians, and Fish*

Reptile and amphibian presence within the Project site was determined through review of the New York State Amphibian and Reptile Atlas (NYSDEC, 2011a). The Atlas Project was a ten-year survey (1990 through 1999) designed to document the geographic distribution of the state's herptofauna.

Atlas data was collected and organized according to USGS 7.5-minute quadrangles. Based on this data, along with documented species ranges and existing habitat conditions, it is estimated that up to 25 reptile and amphibian species could occur in the area (see Wildlife Species list in Appendix H). Other than incidental observations during wetland delineations, no on-site field surveys have been conducted to document actual occurrence of reptiles and amphibians on-site. Species likely to occur in the Project site based on Atlas data and existing habitat conditions, include American toad, red-backed salamander, painted turtle, common snapping turtle, eastern garter snake, northern water snake, bullfrog, and spring peeper. All of these species are common and widely distributed throughout New York State.

The Amphibian and Reptile Atlas also indicated the possible occurrence of Blandings turtle (state-listed threatened), along with spotted turtle, wood turtle, and Jefferson salamander, all of which are listed as special concern by the NYSDEC. None of the listed species documented in the area by the NYS Amphibian and Reptile Atlas were identified by the NHP as occurring within or adjacent to the Project site. Blandings turtle is found primarily in wetlands along the shoreline of the St. Lawrence River, north of the Project site. Spotted turtle is an aquatic species that frequents marshy meadows, swamps and small ponds, and could be found in wetlands on the Project site. Wood turtle is a terrestrial species that utilizes a wide variety of upland habitats. Wood turtles hibernate in waterbodies, and could occur within the Project site. Jefferson salamander is a member of the family *Ambystomidae*, or mole salamanders. These salamanders stay underground most of their lives, but emerge and congregate in vernal pools for courtship and mating immediately after the first warm rains of early spring. They inhabit deciduous forests and require cover in the form of small mammal burrows, fallen logs and rocks, and wetlands or vernal pools as breeding habitat. These habitat elements occur within woodlots on the Project site, and this species therefore could be found in such areas.

Ponds and streams within and adjacent to the Project site support both warm water and cold water fish populations (some native and some stocked). Fisheries data provided by NYSDEC Region 6 personnel indicate that at least 36 fish species occur in the Chaumont River, Perch Lake, and Perch River. These are primarily warm water species, including bluegill, brown bullhead, largemouth bass, smallmouth bass, walleye, yellow perch, rock bass, northern pike, chain pickerel, and a variety of shiners and minnows (R. Klindt, pers. comm.). In addition, Pacific salmon migrate up the Chaumont River and Perch River from Lake Ontario in the fall. No state-classified trout streams or trout spawning streams occur in the Project site. Ponds within the area likely support a warm water fish community (e.g., bass, sunfish, and shiners). Most of the ponds and streams within the Project site are located on private property and lack any provisions for public access (i.e., public fishing

easement). The most significant fisheries in the region include the St. Lawrence River and Lake Ontario, which are within approximately 7.5 and 4.5 miles from the nearest proposed turbines, respectively.

3.3.2 Potential Impacts

3.3.2.1 Construction

Based on the current Project layout and studies conducted to date, anticipated construction-related impacts to vegetation, wildlife, and listed threatened and endangered species are outlined in the following section.

3.3.2.1.1 Vegetation and Ecological Communities

Project construction will result in temporary and permanent impacts to vegetation within the Project site. However, no plant species occurring in the Project site will be extirpated or significantly reduced in abundance as a result of construction activities.

Construction-related impacts to vegetation include cutting/clearing, removal of stumps and root systems, and increased exposure/disturbance of soil. Along with direct loss of (and damage to) vegetation, these impacts can result in a loss of wildlife food and cover, increased soil erosion and sedimentation, and a disruption of normal nutrient cycling. Impacts to vegetation will result from site preparation, earth-moving, and excavation/backfilling activities associated with construction/installation of staging areas, access roads, foundations, and buried electrical interconnect.

Based on the current Project layout and the area of impact assumptions presented in Table 3 in Section 3.0, these activities result in a total disturbance (temporary and permanent) to approximately 498.5 acres of vegetative communities, of which approximately 333 acres is agricultural land, 46 acres is successional old field, 70 acres is successional shrubland, 48.5 acres is forestland, and one acre is disturbed/developed land (less than one-tenth of an acre is open water). Approximately 279 acres of total agricultural land impacts can be classified as grassland, pasture or hayfield. These areas are already subject to periodic disturbance in the form of mowing, plowing, harvesting, etc. However, grasslands, hayfields and pastureland do provide habitat for grassland avian species (including State listed species or species of concern such as northern harrier, short-eared owl, upland sandpiper, grasshopper sparrow, vesper sparrow, Henslow's sparrow and sedge wren), and will be disturbed by Project construction. The unavoidable impacts to grassland habitat (temporary and permanent disturbance of up to 249 acres) and the related indirect construction impacts to

grassland avian species will also be addressed in the Article 11 application to the NYSDEC. The majority of the 498.5 acres of disturbance to vegetative communities will be temporary, and 404.5 acres will be allowed to regenerate to successional or other native communities following restoration of areas disturbed during construction.

In regard to listed rare plants and significant natural communities, no construction-related impacts to these resources are anticipated. Based upon field surveys conducted to date significant habitat or rare plant communities were not observed within the vicinity of proposed Project components. An additional rare plant/community survey will be conducted to confirm whether any of these resources occur within the Project site prior to construction. Any Project components that could impact identified rare plants and communities will be relocated. Listed plants located in the vicinity of potential disturbance will be marked with signage and orange construction fencing, and will be protected from disturbance for the duration of construction.

3.3.2.1.2 Fish and Wildlife

In general, construction-related impacts to wildlife will be minimized by siting Project components away from sensitive habitat such as streams, wetlands, fallow grasslands, mature forest, and areas that display characteristics of calcareous pavement barrens or limestone woodlands. Construction-related impacts to wildlife are anticipated to be limited to incidental injury and mortality due to construction activity and vehicular movement, construction-related silt and sedimentation due to extreme storm events that may impact aquatic organisms, habitat disturbance/loss associated with clearing and earth-moving activities, and displacement of wildlife due to increased noise and human activities. The significance of this impact will vary by species and the seasonal timing of construction activities.

Incidental injury and mortality should be limited to sedentary/slow-moving species such as small mammals, reptiles, and amphibians, that are unable to move out of the area being disturbed by construction. If construction occurs during the nesting season, wildlife subject to mortality could also include the eggs and young offspring of nesting birds, as well as immature mammalian species that are not yet fully mobile. More mobile species and mature individuals should be able to vacate areas that are being disturbed.

Existing data sources and site-specific surveys indicate that one federally-listed endangered species (Indiana bat), and up to 33 state-listed endangered, threatened, and special concern species could occur on site and thus be affected by Project construction (see Table 10). Potential impacts to these species are discussed below.

3.3.2.1.2.1 Birds

Given the type of habitat most likely to be disturbed by Project construction (based on ecological community mapping and current Project layout) the State listed and species of concern most likely to be impacted by project construction will be grassland birds including short-eared owl, upland sandpiper, northern harrier, Henslow's sparrow, grasshopper sparrow and sedge wren. Construction-related impacts to these species could include disturbance/displacement, habitat loss, and/or mortality impacts to eggs or young. With respect to habitat loss, a relatively small area of grassland habitat is being directly impacted by Project construction, (approximately 279 acres). A total of 3,736 acres of the 9,450-acre Project area is grassland/hayfield habitat, and the impacts this habitat represent only 7% of the available habitat. Additionally, the total impacts to grassland/hayfield habitat as a result of the construction of the Project are a very small percentage (0.1%) of the grassland/hayfield habitat present in Jefferson County (Homer et al., 2004).

Clearing of forest vegetation is anticipated to total approximately 48.5 acres, and while the extent of forest clearing is small relative to current forestlands in the region, clearing could have similar effects on listed forest-dwelling bird species, including sharp-shinned hawk, Cooper's hawk, northern goshawk, and red-shouldered hawk. These impacts will be limited by minimizing impacts to forest habitat. On-site Project impacts to forests affect primarily relatively small blocks or woodlots that generally are not attractive nesting habitats for sharp-shinned hawk, Cooper's hawk and northern goshawk.

Because construction-related impacts to wetlands will total fewer than five acres, and be largely temporary, impacts to listed waterbird species should be limited. Therefore, to the extent that they may occur on the Project site, listed species that rely on open water and wetland habitat, such as bald eagle, least bittern, black tern, osprey, common tern, American bittern and pied-billed grebe should not be significantly impacted by construction activity. No records for nest locations exist for these species within the Project Area based on the results of on-site surveys and information obtained from the NHP.

Listed raptor species documented as migrating through the Project site, such as golden eagle and peregrine falcon will not be affected by project construction.

3.3.2.1.2.2 Bats

The 48.5 acres of total forest clearing could also impact Indiana bats by removing roost trees and/or causing disturbance in the vicinity of these trees. However, this even this impact is considered minor when comparing the total forest clearing to the overall acreage of forestland present within the project site. At total of 1,580 acres of the 9,450-acre Project area is forestland habitat. The 48.5 acres of total forest clearing that will occur as a part of project construction represent only 3% of the potential forestland available for roost habitat for Indiana Bats. More over the Project sponsor will minimize or avoid these impacts by identifying roost trees and taking such steps as are necessary to avoid clearing such trees and related habitat, including moving turbine components and changing construction protocols. In the unlikely instance that a roost tree or critical habit must be disturbed, the applicant will limit such disturbance to the maximum extent practicable in order to minimize such impacts and will propose to offset any such impacts that cannot be avoided by restoring or preserving other suitable habitat. We note that Atlantic Wind is participating in a Biological Assessment (BA), as part of an Endangered Species Act Section 7 consultation with the U.S. Army Corps of Engineers as Lead Agency. The BA will also outline avoidance and minimization measures as discussed here.

3.3.2.1.2.3 Other Mammals

Incidental injury and/or mortality to common terrestrial mammals should be limited to small mammals (mice, shrews, etc.) and immature individuals that are unable to move out of the area being disturbed by construction. More mobile species and mature individuals should be able to vacate areas that are being disturbed.

3.3.2.1.2.4 Reptiles, Amphibians and Fish

Forest habitat subject to disturbance during construction is utilized by various reptile and amphibian species, including wood turtle and Jefferson salamander, which are state-listed species of special concern. These species with limited mobility are particularly susceptible to injury and mortality associated with construction-related forest clearing and earth moving. However, given the small area of forest habitat that is being impacted, any impacts to these species will be minor. As previously stated construction-related impacts to wetlands and streams will also be minor, and largely temporary. However, construction activities could adversely affect water quality and habitat for aquatic reptiles, amphibians and fish. Because suitable habitat is limited and/or not proposed for disturbance, impacts to listed wetland/aquatic species such as Blandings turtle and spotted turtle are not anticipated.

Based on the studies conducted to date, none of the construction-related impacts described above will be significant enough to affect local populations of any resident or migratory wildlife species.

3.3.2.2 Operation

3.3.2.2.1 *Vegetation and Ecological Communities*

Following construction and site restoration, operation of the Project is anticipated to result in the permanent conversion of 48.5 acres of vegetative communities to unvegetated/built facilities (access roads, turbines, crane pads, substation, O&M building, etc.) within the Project site. This total includes approximately 34.5 acres of agricultural land, 4 acres of successional old field, 7 acres of successional shrubland, and 3 acres of forest. Permanent impacts to wetlands were previously discussed in Section 3.2.2.

It should be noted that for forestland, permanent impact includes both conversion to built facilities, and conversion forest to successional communities. This conversion will occur in forested areas within a 175-foot radius of all turbine sites, within the 75-foot wide ROW of the overhead collection line, along access roads and a small area adjacent to the proposed collector substation and interconnection switching station. A total of approximately 24 acres of forestland will be converted to, and maintained as, successional communities for the duration of Project operation. An additional 21.5 acres of temporarily impacted forestland will be allowed to regenerate to a forested community. Other than minor disturbance associated with routine maintenance and occasional repair activities, other disturbance to plants and vegetative communities are not anticipated as a result of Project operation.

In regard to listed rare plants and significant natural communities, no operational-related impacts to these resources are anticipated, as operation-related impacts to vegetation are extremely limited. Operational impacts to vegetation may include limited ROW and access road maintenance activities (located along the same alignments of construction related impacts). Additionally, based on field observations during wetlands delineations and habitat assessments conducted throughout the Project area calcareous pavement barrens and limestone woodlands do not occur within the Project site. Therefore, operational impacts to these resources are not expected.

3.3.2.2.2 *Fish and Wildlife*

Operational impacts to wildlife are expected to include direct loss of habitat, wildlife displacement/disturbance due to the presence of the wind turbines, and avian and bat mortality as a result of collisions with the operating wind turbines. Each of these potential impacts are described briefly below.

Direct Loss of Habitat

Based on the current turbine layout and the impact assumptions included in Table 3 (Section 3.0), a total of 48.5 acres of wildlife habitat could be permanently lost from the Project site (i.e., converted to built facilities). As mentioned in the previous section, the majority of this loss (approximately 34.5 acres) will occur in agricultural lands, which generally have limited wildlife habitat value. However, grassland habitats (approximately 33.5 acres), including pasturelands and hayfields that support grassland bird species, are included within this total.

The proposed Project will result in permanent loss or conversion of 3 acres of forest habitat to built facilities. In addition, approximately 24 acres of forest will be maintained as a successional community (old field, shrubland, or saplings) for the life of the Project. Additionally, the forested habitat being impacted by the Project generally occurs as relatively small blocks or woodlots. Breeding bird survey data indicates that the most common species in the area are those that utilize open field and forest edge habitat. Forest-dwelling species are relatively uncommon. Thus, it is questionable as to whether forest interior conditions exist in these areas. In most places the proposed turbines and access roads, as well as the overhead transmission line, are not far from a forest edge. This being the case, it is not anticipated that these forests will be significantly fragmented by the proposed Project.

In summary, the cumulative habitat loss or conversion resulting from Project development is not significant, and represents less than 1% of the total Project site.

Disturbance/Displacement

Habitat alteration and disturbance resulting from the operation of turbines and other wind farm infrastructure can make a site unsuitable or less suitable for nesting, foraging, resting, or other wildlife use. While wildlife may become habituated to the presence of wind turbines within a few years, the rate (and degree) of habituation is currently unknown because long-term studies have not been conducted. Forest and forest edge birds should not be significantly disturbed because the affected habitat generally consists of forest edges and small forest patches already subject to human

disturbance. In addition, forest-dwelling birds are familiar with tall features (i.e., trees) in their habitat, and appear to have a greater ability to habituate to tall structures.

Wind energy facility operation appears to cause small-scale local displacement of some grassland passerines, possibly due to the intrusion of tall structures on the landscape (Leddy et al. 1999, Mabey and Paul 2007). However, displacement at larger scales has not been reported based on scientific literature available for review. Based on concerns over Project impacts to grassland birds, the Applicant requested that WEST complete a literature review of the effects of wind-energy on grassland birds, and those findings are reported below.

Leddy et al. (1999) surveyed bird densities in Conservation Reserve Program (CRP) grasslands at the Buffalo Ridge wind energy facility in Minnesota, and found that mean densities of 10 grassland bird species were four times higher in areas located 180 meters (591 feet) from turbines than they were in grasslands nearer turbines; however, the study did not account for differences in habitat type at varying distances from turbines. Johnson et al. (2000a) found reduced use of habitat within 100 meters of turbines by seven of 22 grassland-breeding birds following construction of the Buffalo Ridge facility. At the Stateline wind-energy facility in Oregon and Washington, use of areas <50 meters from turbines by grasshopper sparrow (*Ammodramus savannarum*) was reduced by approximately 60%, with no reduction in use >50 meters from turbines (Erickson et al. 2004a). At the Combine Hills facility in Oregon, use of areas within 150 meters of turbines by western meadowlark was reduced by 86%, compared to a 12.6% reduction in use of reference areas over the same time period (Young et al. 2005). Horned larks, however, showed significant increases in use of areas near turbines at both of these facilities, likely because this species prefers areas of bare ground such as those created by turbine pads and access roads (Beason 1995).

Based upon the results of these displacement studies, it is reasonable to assume that displacement effects of turbines on grassland bird species could occur within a distance of 50 meters to 150 meters from turbines sited in grassland habitat. There are 29 turbines proposed within grassland habitat or on the edge of grassland habitat in the Project area. Therefore, based upon a conservative estimate, up to 506 acres of habitat could experience somewhat reduced usage by grassland species as a result of Project operation.

At the Buffalo Ridge facility in Minnesota, the abundance of several bird types, including shorebirds and waterfowl, was found to be significantly lower at survey plots with turbines than at reference plots without turbines (Johnson et al. 2000a). The report concluded that the area of reduced use was limited primarily to those areas within 100 meters of the turbines. These results are similar to those

described by Osborn et al. (1998), who reported that birds at Buffalo Ridge avoided flying in areas with turbines. Devreaux et al. (2008) found no effects of turbines on the distribution or relative abundance of farmland birds, including granivores, at distances of >250 meters. Pearce-Higgins (2009) found golden plover (*Pluvialis apricaria*) and wheatear (*Oenanthe oenanthe*) avoided turbines out to 200 meters, whereas avoidance by snipe (*Gallinago gallinago*) extended to 400 meters in a study conducted in British uplands. Populations of mountain plovers (*Charadrius montanus*) at the Foote Creek Rim wind energy facility in Wyoming initially declined during construction but have partially recovered to pre-construction levels. It is not known whether population changes were responses to the wind energy facility or regional changes in mountain plover populations. Nonetheless, during post-construction nest surveys 11 of 28 nests found (39%) were located within 75 meters (246 feet) of turbines, suggesting displacement effects to breeding mountain plovers may be minimal and the birds habituated to the turbines post-construction (Young et al. 2005).

The potential displacement impacts of the Project on waterfowl, including foraging Canada geese and snow geese, should not be significant, even though large wetlands and waterfowl concentration areas occur within 10 miles of the Project site, and migrating waterfowl can be expected to forage in the farm fields within the proposed wind farm area, sometimes in substantial numbers (between 20 and 35 waterfowl were observed during the breeding bird surveys). This conclusion is based on the results of a study conducted by the Iowa Cooperative Fish and Wildlife Research Unit at the Top of Iowa Wind Farm located in Worth County, Iowa. Due to its proximity to three state-owned Wildlife Management Area's (WMA), the Top of Iowa Wind Farm experiences very high use by waterfowl (over 1.5 million duck and goose use-days per year). Observations at that site revealed that the wind turbines did not affect the use of the fields by Canada geese or other species of waterfowl. In addition, over the two-year course of the study, no turbine-related waterfowl or shorebird mortality was documented (Koford *et. al.*, 2005). Based on these study results, and observations at other wind power projects, the proposed Horse Creek Project is not anticipated to have a significant, long-term displacement (or mortality) effect on resident or migrating waterfowl.

Landowners are also often concerned over the potential displacement effect of wind turbines on game species such as deer and wild turkey. While habituation to the presence of the turbines may not be immediate, species such as deer and wild turkey generally adapt quickly to the presence of man-made features in their habitat (as evidenced by the abundance of these species in suburban settings). Although few studies on the effects of wind energy on big game have been made publicly available to-date, significant displacement of game species from a wind power site has not been reported.

Avian Collision

Avian fatalities at wind power facilities can result from collisions with turbine rotors, guy wires of on-site met towers, and perhaps wind turbine towers. In 2003, an estimated 20,000 - 37,000 birds were killed at about 17,500 wind turbines in the United States (Erickson *et. al.*, 2005). Fatalities reported in this study ranged from zero to about 9 birds per turbine per year, yielding an average of 2.19 birds per turbine per year. Based upon a comprehensive analysis conducted for other operating wind projects across the United States, avian collision with wind turbines is estimated to range from 0 to 14 fatalities per turbine per year (NWCC, 2010). Based on publicly available data from fatality monitoring studies completed in New York State (references listed in Table 12 below), bird fatalities have been generally low relative to data collected in other areas. Bird fatalities have ranged from a low of 1.17 per MW at the Clinton facility (2009) to a high of 5.81 observed at the Maple Ridge facility in 2006 (Table 12).

Table 12. Annual Avian Fatalities at Operating New York State Sites

Project	Year	Bird fatalities/MW/Year
Maple Ridge, NY	2006	5.81
Noble Ellenburg, NY	2009	3.79
Maple Ridge, NY	2007	3.44
Noble Bliss, NY	2008	2.86
Noble Bliss, NY	2009	2.81
Maple Ridge, NY	2008	2.30
Noble Clinton, NY	2008	2.17
Cohocton/Dutch Hill, NY	2009	1.88
Munnsville, NY	2008	1.48
Noble Ellenburg, NY	2008	1.40
Noble Clinton, NY	2009	1.17

References: Cohocton/Dutch Hill, NY (Stantec, 2010), Maple Ridge, NY (2006) (Jain *et. al.*, 2007), Maple Ridge, NY (2007) (Jain *et. al.*, 2008), Maple Ridge (2008) (Jain *et. al.*, 2009a), Noble Bliss, NY (2008) (Jain *et. al.*, 2009b), Noble Bliss (2009) (Jain *et. al.*, 2010), Noble Clinton, NY (2008) (Jain *et. al.*, 2009c), Noble Clinton (2009) (Jain *et. al.*, 2010), Noble Ellenburg, NY (2008) (Jain *et. al.*, 2009d), Noble Ellenburg, NY (2009) (Jain *et. al.*, 2010), Munnsville, NY (Stantec, 2009). *Source: WEST, Inc.*

Based upon these post construction studies conducted between 2006 and 2009 at seven wind farms operating in New York, it is assumed that between 1.1 and 5.81 bird fatalities per megawatt could occur annually at the Project site. Assuming a 96 MW project is developed, between 106 and 558 bird fatalities may occur annually. These mortality estimates are within the range observed at other operating wind projects across the United States, where avian collision with wind turbines has been documented at 0 to 14 fatalities per megawatt per year (NWCC, 2010).

Collision risk to resident waterbirds (waterfowl, long-legged waders, shorebirds, rails, etc.) at the Project site is likely to be minimal based on fatality patterns observed at other wind sites, even with the adjacent high quality wetland habitat at the Perch River WMA. As mentioned previously, a study at the Top of Iowa Wind Power Project site revealed that waterfowl are not particularly susceptible to collision with wind turbines (Koford et al. 2005). These birds (including listed species such as least bittern, black tern, common tern, pied-billed grebe, and American bittern) are likely to concentrate their activity at Perch River and other larger wetlands and waterbodies outside of the Project site. Because there are small wetland areas within the Project boundary, some waterbirds may be present, and could be at risk of colliding with turbines. However, because of their small size and limited habitat value, these areas will attract relatively few waterbirds. In addition, research has demonstrated that very few shorebirds collide with wind turbines or other tall structures (Erickson et al. 2001). Therefore, shorebirds are not likely to be at significant risk of colliding with wind turbines at the Project site.

Raptor mortality from collision with turbines has also been low at most operating wind power projects outside of California (NWCC 2010). The known or suspected risk factors for raptors are not apparent at the Project site. The species most likely to be impacted are resident species that forage in open country (e.g., red tailed hawk, American kestrel), as opposed to migrating raptors that pass through the site or general area. The closest noteworthy hawk migration sites in the Project's vicinity is the Derby Hill Hawk Watch, located 40 miles to the south-southwest. As described previously, migrating raptors at the Project site are likely to be widely dispersed over the landscape. Even where concentrated hawk migration does occur around wind energy sites, evidence to date shows that risk to migrating raptors is not great and not likely to be biologically significant. Evidence from operating wind facilities suggests that projects sited in areas with high prey availability and high raptor activity would be most susceptible to collision-induced mortality (Smallwood 2008 and NWCC 2010). The Project is not located in an area containing high prey availability.

Post-construction fatality estimates for raptors from publically available studies completed in New York indicate low risk of collision at all facilities; estimates range from 0.04 raptors per MW/year (Maple Ridge 2006; Jain et al 2007) to 0.49 per MW/year (Ellenburg 2009; Jain et al 2010). Diurnal raptor fatalities published in publically available fatality monitoring reports include eight red-tailed hawks, two broad-winged hawks, one American kestrel; in addition to a single great-horned owl (see Table 12 for references). All of these species are common within New York State and the region and none of these impacts would lead to population level effects.

Reports from Tarifa, Spain, where raptor migration is highly concentrated, strongly suggest that migrating raptors rarely collide with turbines (DeLucas et al. 2004). Studies have documented high raptor collision avoidance behaviors at modern wind facilities (Whitfield & Madders, 2006; Chamberlain *et. al.*, 2006). Although the mechanism of raptor turbine avoidance is unknown, most raptors are diurnal and have good eyesight, suggesting they may be able to detect turbines visually as well as acoustically.

Listed raptor species observed on site only during migration (e.g., golden eagle, peregrine falcon) should not be significantly impacted by the operating Project. These diurnal migrants have good eyesight and appear capable of avoiding operating turbines. While bald eagles are unlikely to use the Project site for nesting or foraging, the bird's expanding population in New York State may eventually bring it to nest in the adjacent Perch River WMA. However, bald eagles, like most raptors, are not known to be susceptible to colliding with structures such as wind turbines (Erickson et al., 2001) or communication towers (Shire et al., 2000). No bald eagle fatalities have been reported at wind facilities in the United States to our knowledge. The northern harrier (threatened) forages and nests on site, and therefore is at some risk of collision with turbines. The low foraging flight of these birds is generally below the rotor-swept height, but their aerial displays during the nesting season can put them at rotor height and at increased risk of collision. However, although harriers occur regularly at wind power sites, there are only a few records of collisions, none of which have occurred within New York state or the region.

Operational impacts to State listed or species of concern grassland bird species documented on site or adjacent sites, such as short-eared owl, Henslow's sparrow, northern harrier, upland sandpiper, grasshopper sparrow and sedge wren, could include collision mortality. Certain State listed species that have aerial courtship displays could be at increased risk of collision when engaged in these activities. Such species include short-eared owl (endangered), northern harrier (threatened), upland sandpiper (threatened), and Henslow's sparrow (threatened). Based on concern over impacts to these species, the Applicant requested that WEST complete a literature review of publically available mortality data to determine the level of direct impact observed at operating wind facilities; the results of which are summarized below.

A total of 41 studies were reviewed, 10 of which have been conducted in the northeastern U.S. These studies were analyzed to determine national, regional and state impact rates (annual and seasonal) for grassland birds. Nationally, among the target grassland birds, 10 short-eared owls, four northern harriers and one upland sandpiper have been documented as turbine collision-induced

fatalities, while no Henslow's sparrow fatalities have been reported (Table 13 below). No short-eared owl or northern harrier or upland sandpiper fatalities have occurred in the northeast U.S., or in New York State. Fatalities of northern harrier and, in particular, short-eared owl, have been concentrated in the northwestern U.S.; 40% (4) of short-eared owl fatalities have been documented at a single project (Big Horn) and 50% (2) of northern harrier fatalities have occurred at a single project (Hopkins Ridge), both in Washington State. Mortality monitoring at operating wind power projects have not indicated that other listed grassland species are highly susceptible to collision mortality. Based upon the results of these fatality studies, the risk of collision-induced mortality for these species at the site is relatively low.

Table 13. National Avian Mortality Among Target Grassland Birds

Project	State	Reference	# Casualties	% Casualties	Date
Short-Eared Owl					
Big Horn	WA	Kronner et al. 2008	4	2.2	1/2/2007
					1/4/2007
					1/23/2007
					5/5/2007
Foot Creek Rim	WY	Young et al. 2003	1	0.6	9/28/2000
Judith Gap	MT	TRC 2008	1	1.6	8/18/2006
Klondike II	OR	NWC and WEST 2007	1	2	8/7/2006
Leaning Juniper I	OR	Kronner et al. 2007	1	2.3	4/3/2007
Nine Canyon	WA	Erickson et al. 2003	1	1.6	4/7/2003
NPPD Ainsworth	NE	Derby et al. 2007	1	1.9	4/9/2006
Northern Harrier					
Hopkins Ridge 2008	WA	Young et al. 2009b	1	1.1	11/20/2008
SMUD Solano	CA	URS et al. 2005	1	5.9	1/4/2005
Altamont	CA	APWRA-MT 2008	1	0.1	4/5/2007
Hopkins Ridge 2006	WA	Young et al. 2009b	1	1.7	1/19/2006
Upland Sandpiper					
NPPD Ainsworth	NE	Derby et al. 2007	1	1.9	6/12/2006

Source: WEST, Inc.

Collision mortality for listed forest-dwelling birds is likely to be very limited, since few turbines are currently proposed to be located in forested areas. Sharp-shinned hawk, Cooper's hawk, and northern goshawk (all special concern) can be expected to forage primarily within forested areas. As a consequence, they will not be at particular risk of collision with the turbines. Minor disturbance impacts may occur if turbines are placed near nesting sites of these species in woodland areas. However, it is unlikely that the turbines would, over the long term, displace many birds nesting in the forest edges and patches on site. As mentioned previously, living among trees, forest dwelling birds appear to have a greater ability to habituate to tall structures. Kerlinger (2002) found modest disturbance to forest dwelling songbirds at a wind power site in Vermont, but no long-term studies on habituation have been conducted.

As these study results illustrate, bird collisions are relatively infrequent events at wind farms. No federally-listed endangered or threatened species have been recorded, and only occasional raptor, waterfowl, or shorebird fatalities have been documented. In the midwestern and eastern United States, night migrating songbirds have accounted for a majority of the fatalities at wind turbines. In general, the documented level of fatalities has not been large in comparison with the source populations of these species, nor have the fatalities been suggestive of biologically significant impacts to species. The observed level of mortality is also minor when compared to other potential sources of avian mortality (Erickson *et al.*, 2001).

Preconstruction nocturnal migration (radar) studies at the Project site indicate that average passage rate (450 t/km/hr), mean altitude of nighttime migrants (443 meters [1,453 feet]), and percent of targets flying below turbine height (14%) are consistent with those documented at other sites in the Eastern United States, as indicated in Appendix J. As noted above, collision impacts have been at studied numerous wind power projects, and the overall number of avian fatalities, the species involved, and the fatality rate (per turbine per year) are consistently low. The risk assessment for the Project was based on pre-construction indices (e.g., Phase I Assessment and radar data) and indicators of risk (e.g. prey concentration) at the proposed Project site, along with empirical data from operating projects (e.g., avian mortality surveys).

No population level effects to birds have been documented as a result of wind-turbine collisions (NWCC 2010). As indicated above, the predicted level of fatalities is minor when compared to other sources of mortality, including collision with buildings/windows, predation by housecats, use of agricultural pesticides, collision with communication towers, collision with power lines, and collision with vehicles (Erickson *et.al.*, 2001; Klem, 1991; Coleman & Temple, 1993; Pimental & Acquay, 1992).

Bat Collision

Findings from the Mountaineer Wind Facility in West Virginia and the Meyersdale Wind Facility in Pennsylvania have heightened concerns regarding collision risk to migratory bat populations. While few studies have been conducted to document bat mortality at operating wind power sites, Johnson and Strickland (2004) found bat mortality rates at wind projects sited along forested ridgelines in the Appalachians of 46.2 fatalities per turbine per year. This differs from the much lower rates (ranging from 0.07 to 2.32 fatalities per turbine per year) documented at mid-west and western sites found in open and mixed landscapes (Erickson *et al.* 2002).

The on-site studies conducted by Stantec in 2005 included documentation of bat activity within the Project area. These acoustic surveys resulted in bat detection rates of 0.9 and 4.7 call sequences per detector per night during the spring and fall studies, respectively. The seasonal results of the acoustic bat surveys at the Project area are within the range of the results found at other sites in New York and the Northeast during similar studies using the same methods (see Table 14, below). Overall, seasonal detection rates found at the Project site are in the middle of the range reported from other studies and there is no indication of any irregular patterns in bat activity in the Project area.

Table 14. Summary of Other Available Bat Detector Survey Results

Location	Landscape	Season	Calls Per Detector Night
Clayton, NY	Great Lakes plain	Spring 2005	0.9
Clayton, NY	Great Lakes plain	Fall 2005	4.7
Cohocton, NY	Agricultural plateau	Fall 2004	2.0
Franklin, WV	Forested ridge	Fall 2004	9.2
Prattsburgh, NY	Agricultural plateau	Fall 2004	2.2
Sheffield, VT	Forested ridge	Fall 2004	1.8
Sheffield, VT	Forested ridge	Spring 2005	0.17
Deerfield, VT	Forested ridge	Spring 2005	0.07
Marble River, NY	Ag. plateau/ADK foothills	Spring 2005	0.26
Jordanville, NY	Agricultural plateau	Spring 2005	0.5
Cohocton, NY	Agricultural plateau	Spring 2005	0.72
Prattsburgh, NY	Agricultural plateau	Spring 2005	0.28
Liberty Gap, WV	Forested ridge	Spring 2005	0.5
Churubusco, NY	Ag. plateau/ADK foothills	Fall 2005	5.6
Cohocton, NY	Agricultural plateau	Fall 2005	1.6
Fairfield, NY	Ag. plateau/ADK foothills	Fall 2005	1.7
Jordanville, NY	Agricultural plateau	Fall 2005	4.8
Mars Hill, ME	Forested ridge	Fall 2005	0.8
Redington, ME	Forested ridge	Fall 2005	4.2
Sheffield, VT	Forested ridge	Fall 2005	1.2
Sheldon, NY	Ag. plateau	Fall 2005	34.9
Sheffield, VT	Forested ridge	Spring 2006	7.9
Sheffield, VT	Forested ridge	Fall 2006	1.1

Several studies that involved concurrent bat activity surveys and fatality monitoring have reported bat mortality rates are roughly correlated with the indices of bat activity (i.e., call detection rates;

Kunz et al 2007). Sites with the lowest bat activity had relatively low bat mortality while those with the highest activity levels exhibited much higher rates of mortality (see Table 15).

Table 15. Comparison of Mortality and Bat Activity Indices

Site	Total detector nights	Survey Periods	Bat Mortality (#/turbine/survey period)	Bat activity (#/detector/night)
Mountaineer, WV	33	Fall (1)	38	38.2
Buffalo Mtn., TN	149	Spring-fall (2)	20.8	23.7
Top of Iowa, IA	42	Spring-fall (2)	10.2	34.9
Buffalo Ridge, MN	216	Summer-fall (2)	2.2	2.1
Foote Creek Rim, WY	39	Summer-fall (2)	1.3	2.2

Source: Johnson et. al. 2000, Kerns and Kerlinger 2004, Koford 2005, Nicholson 2005 and Young et.al 2003).

As mentioned previously, the overall bat activity index (the average number of bat calls per detector-night) at the Project site was between 0.9 (spring) and 4.7 (fall) calls per detector night, which is consistent with those at the lower end of the rates observed at the five sites listed in Table 15. If this activity index is an indicator of potential collision mortality, as the information from other studies suggests it could be, bat mortality at the Project will be relatively low. However, it is still not clear that pre-construction indices of bat activity are good predictors of post-construction risk to bats. Because population sizes are poorly known, it is difficult to determine whether bat fatalities at wind facilities represent a significant threat to North American bat populations, although cumulative impacts associated with White Nose Syndrome and other sources of mortality raise concern and more studies are needed to assess population impacts (NAS 2007; Kunz et al. 2007, Arnett et al. 2008).

In addition to bat activity rates as indices for bat mortality, predicting the timing of mortalities may also be possible. There are several post-construction mortality surveys conducted over extended periods of time which have documented that the majority of bat fatalities actually occur over a relatively short period of time, primarily during August and September (Kunz et al 2007, Arnett et al 2008, Arnett et al 2010). Erickson et al. (2002) identified five wind energy facilities that were searched for fatalities from May 1 to November 15 (4 of the 5 facilities) or from July 1 to November 15 of various years. Of the bat fatalities observed at those facilities, 89.4% occurred during the time period between July 16 and September 15, and were believed to be migrant bats rather than resident bats. Kerns and Kerlinger (2004) provided similar evidence that bat fatalities are concentrated during the late summer and fall migration period. During a seven month study (April 4 to November 11) 92.5% of all bat fatalities occurred between August 18 and September 30.

Therefore, it is reasonable to expect that most bat mortality at the Project will occur in the same time frame and will primarily affect migratory tree roosting bats.

In recent years it has become evident that impacts to bats may actually be more of a concern than potential impacts to avian species (Luxmore, 2009). An analysis of bat fatalities at wind energy facilities across the U.S. resulted in an estimate of 0 to 39 bats per MW (NWCC, 2010). In New York State, bat fatality rates have ranged from 0.46 per MW/year (Dutch Hill 2009, Jain et al 2010) to 14.66 per MW/year (Bliss 2008: Jain et al 2009) (see Table 16, below). Using this range, the Project could potentially result in between approximately 44 and 1407 bat deaths per year.

Table 16. Annual Bat Fatalities at Operating New York State Sites (fatalities/MW/Yr)

Project	Year	Bats
Cohocton/Dutch Hill, NY	2009	16.02
Maple Ridge, NY	2006	15.00
Noble Bliss, NY	2008	14.66
Maple Ridge, NY	2007	9.42
Noble Clinton, NY	2009	6.48
Noble Bliss, NY	2009	5.50
Noble Ellenburg, NY	2008	5.45
Maple Ridge, NY	2008	5.40
Noble Ellenburg, NY	2009	5.34
Noble Clinton, NY	2008	3.63
Munnsville, NY	2008	0.46

References: Cohocton/Dutch Hill, NY (Stantec, 2010), Maple Ridge, NY (2006) (Jain et. al, 2007), Maple Ridge, NY (2007) (Jain et. al, 2008), Maple Ridge (2008) (Jain et. al, 2009a), Noble Bliss, NY (2008) (Jain et. al, 2009b), Noble Bliss (2009) (Jain et. al, 2010), Noble Clinton, NY (2008) (Jain et. al, 2009c), Noble Clinton (2009) (Jain et. al, 2010), Noble Ellenburg, NY (2008) (Jain et. al, 2009d), Noble Ellenburg, NY (2009) (Jain et. al, 2010), Munnsville, NY (Stantec, 2009). *Source: WEST, Inc.*

Although the majority of documented turbine-related bat mortality has involved three species of migratory tree bat (hoary bat, red bat, and silver-haired bat), the known presence of Indiana bats within the Project site raises the concern that this listed endangered species could be killed at this site once the Project is in operation. The telemetry study conducted by Stantec documented that Indiana bats are likely to return to the Project area on an annual basis. It also demonstrated that once on site, the majority of their movements were not far removed from their roost trees, typically located in deciduous woodlots. However, more extensive movements and foraging in open field areas were also documented. Consequently, it is reasonable to assume that Indiana bats are likely

to travel through, and forage, in areas where operating turbines will be built. This being the case, collision mortality of Indiana bats could occur as a result of Project operation. As a result of this potential “take” of a state and federally-listed endangered species, Atlantic Wind is currently preparing a BA in consultation with the USACOE pursuant to Section 7 of the Endangered Species Act for approval of a Section 404 Permit for impacts to federal wetlands.

However, it should be reiterated, that only two Indiana bat fatalities have ever been documented at an operating wind power project in the U.S., including wind power projects in proximity to Indiana bat hibernacula and summer maternity roosts, and where sizeable numbers of other bat species have been killed.

3.3.3 Proposed Mitigation

3.3.3.1 Vegetation and Ecological Communities

Mitigation of impacts to vegetation will be accomplished primarily through careful site planning. Unique natural communities known to occur in the area (calcareous pavement barrens and limestone woodlands) are being avoided completely, and large areas of forest and wetlands have been avoided to the extent practicable. In addition, any rare plants within the Project site will be identified in a pre-construction rare plant survey and avoided during Project construction and operation. Therefore, the most ecologically significant communities within the Project site will be largely protected from disturbance. In addition, Project access roads will be sited on existing farm lanes to the extent practicable, and areas of disturbance will be confined to the smallest area possible. A comprehensive sediment and erosion control plan will also be implemented to protect adjacent undisturbed vegetation and aquatic ecological resources (See Preliminary SWPPP in Appendix E).

Mitigation measures to avoid or minimize impacts to vegetation will also include delineating sensitive areas (such as wetlands and rare plant habitat) prior to construction to assure that no disturbance or vehicular activities occur in these areas. During Project construction, the construction workforce will receive training on avoiding impact to sensitive resources, and will comply with guidance provided by environmental monitors, employ best management practices during construction, and maintain a clean work area within the designated construction sites. The introduction of invasive exotic plant species will be controlled by assuring that all construction equipment is clean upon arrival on site, and that equipment utilized in areas with an abundance of exotic species (e.g., Phragmites or purple loosestrife) will be cleaned prior to moving to another site. Following construction activities,

temporarily disturbed areas will be seeded with a native seed mix to reestablish vegetative cover in these areas.

3.3.3.2 Fish and Wildlife

As previously discussed, construction-related impacts to fish and wildlife should be limited to incidental injury and mortality due to construction activity and vehicular movement, construction-related silt and sedimentation impacts on aquatic organisms, habitat disturbance/loss associated with vegetation clearing and earth moving activities, and displacement due to increased noise and human activities. Mitigation of impacts related to construction activity will be accomplished through careful site design (e.g., utilizing existing roads, avoiding sensitive habitat, and minimizing disturbance to the extent practicable), adherence to designated construction limits, and avoidance of off-limit sensitive areas.

To avoid and minimize impacts to aquatic resources resulting from construction-related siltation and sedimentation, an approved sediment and erosion control plan and SWPPP will be implemented. The sediment and erosion control plan and SWPPP were previously described in Section 3.2 (Water Resources), and a preliminary SWPPP is included as Appendix E. Proper implementation of these plans will assure compliance with NYSDEC SPDES regulations and New York State Water Quality Standards. In addition, the SPCC plan outlined in the preliminary SWPPP will be developed and implemented to minimize the potential for unintended releases of petroleum and other hazardous chemicals during Project construction and operation.

The Project has been designed and sited in a manner that should minimize bird and bat collision mortality. The Project site is well removed from the shoreline of Lake Ontario and the St. Lawrence River where migratory birds are more likely to concentrate. The turbines will be placed much further apart than in older wind farms where avian mortality has been documented, such as those in northern California. They will also be mounted on tubular towers (rather than lattice), which prevent perching by birds (NWCC, 2010). In an effort to reduce avian and bat impacts, all electrical collection lines between the turbines will be buried, as will the transmission line. Lighting of the turbines (and other infrastructure) will be minimized to the extent allowed by the FAA and follow specific design guidelines to reduce collision risk (e.g., using flashing lights with the longest permissible off cycle).

Mitigation for impacts related to permanent habitat loss and forest fragmentation will be accomplished by minimizing the permanent footprint of Project components, avoiding large areas of

mature forest to the extent practicable, and restoration of all temporarily disturbed areas. In addition, cleared forestland along Project access roads, underground collection routes and at the periphery of turbine sites will be allowed to grow back and reestablish forest habitat in these areas.

The 279 acres of total impacts to grassland habitat are considered minor when viewed in the context of the overall acreage of grassland habitat in the Project area or within Jefferson County. The majority of these total impacts will be minimized through the restoration of 249 acres of grassland, following construction. Additionally, unavoidable impacts to grassland habitat will be mitigated by developing a grassland management plan for the Project that includes 1) habitat management monitoring of restored grassland habitat, and 2) encouraging willing landowners to maintain meadow/grassland habitat through annual late season mowing regimes. Developed mowing regimes will encourage late season mowing practices to protect nesting activities. As discussed in the ARA, grasslands in New York are being lost due to farm abandonment and secondary succession back to shrub and forest cover types. Without active management, there is no guarantee that the grassland habitat within the Project site will continue to provide habitat for grassland species over the long term. Implementation of a grassland management plan could help assure the long-term presence of habitat for listed grassland bird species. A management plan that includes habitat monitoring and maintenance regimes for targeted grassland species will benefit other species such as vesper sparrow and grasshopper sparrow and have a net conservation benefit to all grassland species that use habitat in the Project area.

As described in Section 3.3.2.2.2, up to 506 acres of grassland habitat could experience somewhat reduced usage by grassland species as a result of Project operation (displacement effects). Efforts to minimize impacts to vegetative communities are described above. The Applicant will implement a breeding bird displacement study to monitor any displacement effects at the operating project. In addition to implementing the grassland habitat management plan, the Applicant may implement additional adaptive management measures based upon the results of onsite displacement studies if unanticipated impacts are identified during Project operations. Adaptive management measures could include additional habitat conservation efforts or modified operation/maintenance activities during the breeding season.

As stated previously, based upon fatality studies conducted nationwide and in New York, collision risk to targeted grassland species, as well as other common avian species, is considered low. To further understand the temporary and long-term impacts of the wind facility on listed grassland birds, Atlantic Wind is developing a post construction monitoring study plan in cooperation with the NYSDEC and USFWS. The draft study plan will be included in the FEIS and will follow

recommendations in the Draft Wind Power Guidelines (FAC 2010) and the NYSDEC Guidelines (2009). As stated above, the Project sponsor will also fund post-construction investigations, including fatality monitoring and bird displacement studies, to determine whether impacts to birds are greater than anticipated. The Project sponsor may implement additional adaptive management measures based upon the results of onsite collision/mortality monitoring surveys. Adaptive management measures could include curtailment of the operation of one or more turbines, as necessary.

Based on information collected at the Project area during field surveys and in-person consultation with NYSDEC conducted on October 28, 2010, the Applicant is currently preparing an Article 11 Incidental Take Permit application for five State listed threatened or endangered grassland bird species (Henslow's sparrow, upland sandpiper, northern harrier, short-eared owl and sedge wren). This application will include an impact assessment as set forth in this DEIS as well as a discussion of avoidance and mitigation options as set forth above..

Atlantic Wind is also seeking an Incidental Take Permit for Indiana Bats through an Endangered Species Act Section 7 consultation. The U.S. Army Corps of Engineers is the lead agency for the Section 7 consultation process with the U.S. Fish and Wildlife Service. As part of the consultation process, In this process Atlantic Wind will include mitigation measures discussed above, including curtailment operational measures, turbine cut-in speed adjustments, habitat restoration, and conservation easements to offset any potential take of Indiana bats as a result of construction or operation of the proposed Project. Final agreed-upon mitigation measures for Indiana bats will be included in the FEIS.

Post-construction monitoring plans will be developed as part of the Article 11 application and Indiana bat BA. Post-construction studies will be designed to address direct and indirect impacts to bats and birds, as well as specific threatened and endangered species addressed in the specific documents. Study plans will be circulated to the NYSDEC and the USFWS for comment prior to implementation. In addition to post-construction monitoring, the applicant will be implementing a wildlife reporting and monitoring system at the project that will be conducted for the life of its operation to monitor potential trends in fatalities.

3.4 CLIMATE AND AIR QUALITY

3.4.1 Existing Conditions

Existing climatic conditions and regional air quality are discussed below.

3.4.1.1 Climatic Conditions

The NRCS maintains and monitors National Water and Climate Centers (NWCC) in numerous locations throughout the United States. The closest monitoring center to the Project site is located in Watertown, which is approximately 8 miles southeast of the nearest proposed turbine. This NWCC station has collected temperature and precipitation data from 1971 through 2000. Based upon the 30-year averages calculated from this timeframe, the average daily maximum temperature in Watertown is 54.9 degrees Fahrenheit (°F), and the average daily minimum is 36.5°F. Historically, January is the coldest month with an average daily temperature of 18.9°F, and July is the warmest with an average daily temperature of 70.4°F (NRCS, not dated).

The 30-year annual average precipitation recorded in Watertown is 42.70 inches. September, with an average monthly precipitation of 4.59 inches, is historically the wettest month of the year, and February, with an average monthly precipitation of 2.50 inches, is the driest. The 30-year average snowfall recorded in Watertown is 111.9 inches annually. December and January are historically the snowiest months of the year with monthly averages of 29.0 inches and 33.6 inches, respectively. (NRCS, not dated)

3.4.1.2 Air Quality

Air quality data for New York State are published annually by the NYSDEC Division of Air Resources. The most recent summary of air quality data available for the state is the *New York State Air Quality Report for 2009* (NYSDEC, 2010). Along with the most recent ambient air quality data, this report also includes long-term air quality trends derived from data that has been collected and compiled from numerous state and private (e.g., industrial, utilities) monitoring stations across the state. These data are organized by NYSDEC region (the Project site is located in NYSDEC Region 6). Air quality sampling points for Region 6 occur in Nick's Lake, south of Old Forge (Herkimer County), unspecified locations in Utica (Oneida County), Potsdam (St. Lawrence County), and Camden (Oneida County), and along the Perch River north of Watertown (Jefferson 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.

3.4.2 Potential Impacts

Anticipated Project impacts based upon the initial layout are presented below. Given the nature of the air quality resources, it is not anticipated that a final Project layout of equal magnitude would exceed any threshold or temporary or permanent impact presented in this section. This assumption is based on the fact that all the same best management practices will be applied to a project of any final configuration.

3.4.2.1 Construction

During the site preparation and construction phases of the Project, minor, temporary adverse impacts to air quality will result from the operation of construction equipment and vehicles. Impacts will occur as a result of both emissions from engine exhaust and from the generation of fugitive dust during earth moving activities and travel on unpaved roads. Additionally, the Project will require the utilization of a concrete batch plant. The increased dust and emissions will not be of a magnitude or duration that would significantly impact local air quality. However, dust in particular could cause annoyance and property damage at certain yards and residences that are adjacent to unpaved town roads or Project access roads. These impacts are anticipated to be short-term, localized, and will be avoided or corrected quickly, as discussed below.

3.4.2.2 Operation

The operation of this Project is anticipated to have a positive impact on air quality by annually producing 252,290 Megawatt hours (MWh) (assuming 48-2.0 MW turbines operating at 30% annually) of electricity with zero emissions. Power delivered to the grid from this Facility will directly offset the generation of energy at existing conventional power plants (Jacobsen & High, 2008). Based on emissions rates for electricity used in New York (Abraxas Energy, 2010; Leonardo Academy, 2004), this 252,290 MWh wind farm is estimated to annually displace:

- 177 tons of NO_x
- 467 tons of SO₂
- 130,685 tons of CO₂

The operation of this Project is not anticipated to have any measurable effect on climate. Some recent studies have suggested that there may be minor impacts to microclimates within 0.5 mile of wind turbines. Modeling conducted by Roy, *et al.* (2004) suggests that large scale wind turbine

installations (10,000 turbines) may have a warming effect on the local climate. During the environmental review process for a wind farm in Chautauqua, New York, a study group analyzed the impacts of wind turbines on vineyard microclimates (DeGaetano, *et al.*, 2004). This study group determined that a wind turbine could influence the ground level air temperature by no more than one degree Celsius (°C) and concluded that there were unlikely to be significant positive or negative impacts to area vineyards as a result of this potential change in microclimate. On a larger scale however, by generating 96 MW of electricity without the production of “green house” gasses, the Project represents a legitimate effort to mitigate the well-established causes of global climate change.

3.4.3 Proposed Mitigation

As described above, except for minor, short-term impacts from construction vehicles, the Project will have no adverse impacts on air quality. The extent of exposed/disturbed areas on the site at any one time will be minimized and restored/stabilized as soon as possible. The environmental monitor will identify dust problems and report them to the construction manager and the contractor. To mitigate localized impacts on air quality, water will be used to wet down dusty roads (public roads as well as Project access roads) as needed throughout the duration of construction activities. Water will either be hauled into the Project area by truck, or a will be from an existing or new well source. In more severe cases, temporary paving (e.g. oil and stone) could be used to stabilize dusty road surfaces in certain locations. In addition, Atlantic Wind will implement a Complaint Resolution Procedure to establish an efficient process by which to report and resolve any construction (or operational) related impacts.

The proposed concrete batch plant would be operated with the appropriate air quality controls to be exempt from a NYSDEC Air Quality Permit in accordance with 6 NYCRR 201-3.2(c)(37), Subpart 201-3, Exemptions and Trivial Activities. Concrete batch plants are exempt from air permitting and registration "where the cement weigh hopper and all bulk storage silos are exhausted through fabric filters and the batch drop point is controlled by a shroud or other emission control device." A local water source or constructed well will be used to draw water for the onsite concrete batch plant.

Operation of a wind farm has benefits on local and regional air quality (See Section 2). Project operation has the potential to reduce current emissions from existing power plants, mitigating the effects of their operation. The United States currently obtains approximately 71 percent of its electricity from fossil fuels, with 49 percent coming from coal, the fossil fuel with the highest carbon dioxide content per unit of electricity produced (EIA, 2007a). Total annual carbon dioxide emissions

in the United States approach 6 billion metric tons (EIA, 2007b); these emissions are projected to rise to 7 billion metric tons annually by 2030 (EIA, 2008). Every 10,000 MW of wind installed can reduce carbon dioxide emissions by approximately 33 million metric tons (MMT) annually if it replaces coal-fired generating capacity, or 21 MMT if it replaces generation from the United States average fuel mix (San Martin, 1989).

A detailed analysis by the Department of Energy's Pacific Northwest Laboratory in 1991 estimated the energy potential of the United States wind resource at 10.8 trillion kilowatt-hours (kWh) annually (Elliot *et al.*, 1991). This potential generating capacity represents more than twice the electricity generated in the U.S. today (EIA, 2010). Switching from fossil fuel energy generation to wind power generations contributes to cleaner and healthier air, since wind power generation has zero emissions and is not a direct source of regulated pollutants such as nitrogen oxides, sulfur dioxide, and mercury. If the United States obtained 20% of its electricity from wind energy by 2030, the country could avoid putting 825 MMT of CO₂ annually into the atmosphere, or a cumulative total of 7.6 billion metric tons by 2030 (USDOE, 2008). Thus, by contributing to this effort, the Project will have an incremental and long-term beneficial impact on climate and air quality. This benefit should be viewed as mitigation for other environmental impacts associated with the Project.

3.5 VISUAL AND AESTHETIC RESOURCES

3.5.1 Existing Conditions

Based on established visual assessment methodology (NYSDEC, 2000; APA, not dated) a visual study area is typically defined as the area within a 5-mile radius of a proposed Project. However, based on site-specific topographic and land use characteristics, and in accordance with NYSDEC Visual Policy (NYSDEC, 2000), inventory of visually sensitive resources and visibility studies were extended to a more conservative and broader 10-mile radius (Figure 11). Existing visual and aesthetic resources within the visual study area were identified as part of a Visual Impact Assessment (VIA) conducted by EDR (Appendix K). The VIA included a review of existing data and field reconnaissance to identify landscape similarity zones, viewer groups, and sensitive visual resources within the area. These existing visual/aesthetic components of the study area are described below.

3.5.1.1 Landscape Similarity Zones

Land use within the 10-mile-radius visual study area is dominated by undeveloped land (agricultural, successional, wetland, and wooded), farms, and rural and suburban style residences. Dairy farming and production of hay are the primary agricultural activities. Within five miles of the Project, higher

density residential and commercial development is concentrated in the Villages of Clayton and Chaumont and several small settlements including the hamlets of Depauville and LaFargeville.

Within the visual study area, five distinct landscape similarity zones (LSZ) were defined. The general landscape character of these zones is described below. Each of these is described in more detail in Appendix K.

Zone 1. Rural Residential/Agricultural Zone

The Rural Residential/Agricultural landscape similarity zone (LSZ) tends to be concentrated in the central portion of the study area. The landscape is characterized by relatively flat topography with a mix of farms and rural residences, open fields, hedgerows, and woodlots. Due to the presence of open fields, views within this LSZ are more open and long distance than those available in most other zones within the study area.

Zone 2. Village/ Hamlet Zone

This landscape similarity zone includes the Villages of Clayton and Chaumont, and the hamlets of Depauville, Limerick, and LaFargeville. This zone is characterized by low to moderate-density residential and limited commercial development. Vegetation and landform contribute to visual character in the village and hamlet areas, but within the majority of this zone, buildings (typically 1-2 stories tall) and other man-made features dominate the landscape. Views are most likely from open road corridors and the edges of the Village/Hamlet zone, where housing and vegetation density decrease and therefore screening is reduced.

Zone 3. Water/Waterfront Zone

This landscape similarity zone includes areas of open water, large wetlands, and shorelines within the study area. The character-defining component of this LSZ is the presence of open water as a dominant foreground element in the view, which provides opportunities for unobstructed views of mid-ground and background features in the surrounding landscape. The recreational use these water bodies receive makes viewer sensitivity to visual quality and visual change in this zone generally high. Along the outer portions of the visual study area, this LSZ includes portions of the St. Lawrence River, Lake Ontario (including Black River Bay and Chaumont Bay), and the Black River. Views from the Lake Ontario and St. Lawrence River shorelines are typically oriented toward the water, while views from the surface of these waterbodies typically include numerous developed features, including shoreline homes, boat houses, docks, marinas, water towers, etc.

Zone 4. Forestland Zone

This major landscape similarity zone is characterized by the dominance of successional forest vegetation (mixed deciduous and coniferous tree species), and occurs primarily in the western portion of the visual study area. Views in the Forested zone are typically limited due to the screening provided by overstory trees. Land use in this zone includes forestry, low-density residential development, and recreational use (hunting, snowmobiling, etc.).

Zone 5. Urban/Mixed Use Zone

The urban/mixed use LSZ includes the City of Watertown and adjacent suburban areas, located at the southeastern extent of the 10-mile radius study area. Within the majority of this zone, buildings (typically 2-4 stories tall) and other man-made features dominate the landscape. The buildings are organized for the most part along main avenues (state highways) that extend radially from the urban core, with grid-like streets that fill the areas between the avenues. This arrangement generally serves to focus views along the streets and block long distance outward views. Longer distance views toward the surrounding landscape are available from some major roads (e.g., Interstate 81, NYS Routes 3 and 11) and possibly from the upper interiors of multi-storied downtown buildings.

These landscape similarity zones are illustrated in Figure 5 in Appendix K.

3.5.1.2 Distance Zones

Three distinct distance zones are typically defined in visual studies. Consistent with well-established agency protocols (e.g., Jones and Jones 1977; U.S. Forest Service, 1995), EDR generally defines these zones as follows:

- *Foreground:* 0 to 0.5 mile. At these distances, a viewer is able to perceive details of an object with clarity. Surface textures, small features, and the full intensity and value of color can be seen on foreground objects.
- *Mid-ground:* 0.5 to 3.5 miles. The mid-ground is usually the predominant distance at which landscapes are seen. At these distances a viewer can perceive individual structures and trees but not in great detail. This is the zone where the parts of the landscape start to join together; individual hills become a range, individual trees merge into a forest, and buildings appear as simple geometric forms. Colors will be clearly distinguishable, but will have a

bluish cast and a softer tone than those in the foreground. Contrast in color and texture among landscape elements will also be reduced.

- *Background:* Over 3.5 miles. The background defines the broader regional landscape within which a view occurs. Within this distance zone, the landscape has been simplified; only broad landforms are discernable, and atmospheric conditions often render the landscape an overall bluish color. Texture has generally disappeared and color has flattened, but large patterns of vegetation are discernable. Silhouettes of one land mass set against another and/or the skyline are often the dominant visual characteristics in the background. The background contributes to scenic quality by providing a softened background for foreground and mid-ground features, an attractive vista, or a distant focal point.

3.5.1.3 Viewer/User Groups

Three categories of viewer/user groups were identified within the visual study area. These include the following:

Local Residents

Local residents include those who live and work within the visual study area. They generally view the landscape from their yards, homes, local roads and places of employment. Residents are concentrated in and around the City of Watertown, the Villages of Clayton and Chaumont, and hamlets of Depauville, Limerick, and LaFargeville, but occur in relatively low density throughout the visual study area. Except when involved in local travel, residents are likely to be stationary, and have frequent or prolonged views of the landscape. Local residents may view the landscape from ground level or elevated viewpoints (typically upper floors/stories of homes). Residents' sensitivity to visual quality is variable, however, it is assumed that residents may be very sensitive to changes in particular views that are important to them.

Through Travelers/Commuters

Commuters and travelers passing through the area view the landscape from motor vehicles on their way to work or other destinations. Commuters and through-travelers are typically moving, have a relatively narrow field of view, and are destination oriented. Drivers on major roads in the area (Interstate Route 81, State Routes 12, 12E, 180, and 411) will generally be focused on the road and traffic conditions, but do have the opportunity to observe roadside scenery. Passengers in moving vehicles will have greater opportunities for prolonged off-road views than will drivers, and accordingly, may have greater perception of changes in the visual environment.

Recreational Users and Tourists

Recreational users and tourists include local residents and out-of-town visitors involved in cultural and recreational activities on waterbodies, at wildlife management areas, along scenic byways, at parks and historic sites, as well as in undeveloped natural settings such as forests and fields. These viewers are concentrated in the recreational facilities/cultural sites located within and adjacent to the visual study area. In the outer portions of the study area, recreational users and tourists are concentrated along the St. Lawrence River and Lake Ontario shoreline. Members of this group may view the landscape from area highways while on their way to these destinations, or from the sites themselves. This group includes birdwatchers, snowmobilers, bicyclists, recreational boaters, hunters, fishermen, and those involved in more passive recreational activities (e.g., picnicking, sight seeing, or walking). Visual quality may or may not be an important part of the recreational experience for these viewers. However, for some, scenery will be a very important part of their experience and in almost all cases enhances the quality of recreational experiences. Recreational users and tourists will often have continuous views of landscape features over relatively long periods of time. However, most recreational viewers and tourists will only view the surrounding landscape from ground-level or water-level vantage points. Open water sites offer open, unobstructed views for many recreational users. Views from shoreline vacation homes and parks are typically oriented toward the water, but also offer opportunities to view inland areas.

3.5.1.4 Visually Sensitive Resources

The area within five miles of the Project includes several sites that the NYSDEC Visual Policy (NYSDEC, 2000) considers aesthetic resources of statewide significance. These include 23 sites/districts listed on the National Register of Historic Places (seven in the Village of Chaumont, 12 in the hamlet of LaFargeville and immediate vicinity, and four in Stone Mills), a section of the Great Lakes/Seaway Trail National Scenic Byway in the southern portion of the study area, and two State Wildlife Management Areas. Aesthetic resources of statewide significance in the area between five and 10 miles from the Project include an additional 38 structures/districts listed on the National Register of Historic Places (NHRP) (with an additional 10 historic structures/districts occurring in the City of Watertown, just outside the 10-mile radius), seven waterfront State Parks, Coyote Flats State Forest, three State Wildlife Management Areas, the Dexter Marsh National Natural Landmark, and the Olympic Trail Scenic Byway. Within the 10-mile radius visual study area, there are no State Forest Preserve lands, National Wildlife Refuges, National Park Service Lands, designated Wild, Scenic, or Recreational Rivers, designated Scenic Areas of Statewide Significance, designated

State or Federal Trails, or designated scenic overlooks (NYSDEC, 2011c; USFWS, 2011; NPS, 2009; National Wild and Scenic Rivers System, 2010; NYSDEC, 2011d; NYSDOS Division of Coastal Resources, 2010; NPS, 2008). Review of existing data also failed to reveal the presence of any State Nature or Historic Preserve Areas or Bond Act Properties purchased under the Exceptional Scenic Beauty or Open Space Category. Beyond these resources of statewide significance, the study area also includes areas that are regionally or locally significant/sensitive, due to the type of land use they receive. These include the Villages of Clayton and Chaumont, hamlets of Depauville, Limerick, and LaFargeville, the Chaumont Bay and River, Lucky Stars Lake, Perch Lake, Interstate 81, and various publicly accessible recreation sites.

Aesthetic resources of statewide or local significance and areas of intensive land use within 10 miles of the proposed Project are listed in Table A in Appendix K. The location of visually sensitive resources within the visual study area is illustrated in Figure 6 of Appendix K, and on the viewshed/sensitive site maps included in Appendix K.

3.5.2 Potential Impacts

3.5.2.1 Construction

Visual impacts during construction will include the addition of construction material and working construction vehicles and equipment to the local roads. However, due to the remote forested location of the Project Site, construction activity/site disturbance, such as tree clearing, earth moving, soil stockpiling and road building, all of which will alter the character of the landscape, at least on a temporary basis, will not be visible to the public. Dust generated by the movement of these vehicles could also potentially have an adverse impact on aesthetic resources. However, all of these activities will be relatively short term (i.e., generally restricted to the construction season), and at any one site, will generally occur on only a few days during the course of Project construction. Once construction activity ceases and site restoration activities are complete, construction-related visual impacts will no longer occur.

3.5.2.2 Operation

Impacts to visual resources resulting from Project operation were evaluated primarily through the VIA prepared by EDR (see Appendix K). Potential Project visibility was evaluated using viewshed mapping and field verification. Visual impact was evaluated by preparing computer-assisted visual simulations of the Project from representatives/sensitive viewpoints from throughout the 10-mile-radius study area. The Project's visual impact on the landscape was evaluated by a panel of registered landscape architects with experience in visual impact assessment.

3.5.2.2.1 *Viewshed Analysis*

Ten-mile radius viewshed maps were prepared to determine the extent of potential Project visibility based on existing topography and vegetation, and the location and height of the proposed wind turbines. Topographic viewshed maps were prepared using USGS digital elevation model (DEM) data (7.5-minute series), coordinates/dimensions of all proposed turbines, and ESRI ArcView® software with the Spatial Analyst extension. The viewshed analyses were based upon a 476 foot (145 meters) blade tip height (the largest turbine models contemplated for this Project so as to present a worst-case scenario), a 328 foot (100m) FAA mandated warning light height, and the location of all proposed turbines, as shown in Appendix K, Figure 8. The analyses run at blade tip height illustrates maximum potential day time visibility, while the analyses run at the height of the FAA aviation warning light defines maximum potential nighttime visibility (under the "worst case" assumption that all of the turbines would be equipped with aviation warning lights). The resulting topographic viewshed maps define the maximum area from which any turbine within the completed Project could potentially be seen within the study area. Because the screening provided by vegetation and structures is not considered in this analysis, the topographic viewsheds represent a "worst case" assessment of potential Project visibility.

To illustrate the potential screening effect of forest vegetation, a vegetative viewshed analysis was also performed. The vegetative viewshed was prepared in the same manner as the topographic viewshed, except that a base vegetation layer was created using USGS National Land Cover Data (2000) and assigning an elevation value (40 feet) to various forest cover types. This layer was then added to the digital elevation model to produce a base layer for the viewshed analysis, as described above (again, using the blade tip and FAA warning light heights as input data). Once the viewshed analysis was completed, the areas covered by the forest vegetation layer were designated as "not visible" on the resulting data layer.

Potential turbine visibility, as indicated by the viewshed analyses, is illustrated in Appendix K, Figure 8. The topographic viewshed maps (Appendix K, Figure 8, Sheets 1 and 2), define the maximum area from which any of the proposed turbines or FAA warning lights could potentially be seen within the study area absent the presence of any intervening vegetation or structures, or visual obfuscation as the distance between the viewer and the turbines increases. This "worst case" assessment of potential day time visibility revealed that the proposed Project could potentially be visible in approximately 86% of the 10-mile study area (discounting the screening effect of existing vegetation

and structures). Areas where there is no possibility of seeing the Project are generally limited to narrow valleys, and hillsides and shorelines oriented away from the Project site. Potentially visible areas include the relatively level lands along State Routes 12 and 180, many of the County Routes in and around the Project site (County Routes 3, 5, 8, 12, 125, 179 and 181), Interstate 81 and the hamlets of Depauville and LaFargeville. As indicated in Appendix K, 71 of the 81 identified aesthetic resources of statewide significance within the 10-mile study area are indicated as having potential views of some portion of the Project (based on blade tip height and topography alone). Aesthetic resources screened from view of the Project by topography alone include portions of the Villages of Brownville, Dexter, and Evans Mills, portions of the St. Lawrence River waterfront between the Villages of Clayton and Cape Vincent, and portions of the Seaway and Olympic Trails. However, this analysis indicates that significant portions of the St. Lawrence River and Lake Ontario could have open, unobstructed views to the Project across the water. Areas of potential nighttime visibility based on the topographic viewshed analysis cover approximately 81% of the 10-mile radius study area, and are indicated in roughly the same locations indicated by the blade tip analysis.

However, factoring vegetation into the viewshed analysis significantly reduces potential Project visibility. Within a 10-mile radius, vegetation, in combination with topography, will serve to screen the Project from approximately 53% of the area (i.e., 47% visibility). Visibility will generally be most available in open agricultural areas that are concentrated in the central portion of the study area (extending roughly north-south on State Route 12, and east-west on County Route 125). Visibility becomes more scattered in the outlying regions, except on the open water of Lake Ontario and the St. Lawrence River. Forested sites in the west-northwest portion of the study area fall outside the vegetation viewshed, as do wooded slopes and the backsides of hills in the eastern portion of the study area. Vegetation viewshed analysis indicates that 62 (77%) of the identified aesthetic resources of statewide significance within the study area should be at least partially screened by vegetation and topography (see Table A in Appendix K). Areas indicated as being screened include portions of Dexter Marsh, northwestern portions of the City of Watertown, the Villages of Evans Mills, Dexter and Brownville, portions of the Villages of Clayton and Chaumont, the majority of the French Creek WMA, large portions of the Seaway Trail, and significant portions of the southern extent of the St. Lawrence River and Lake Ontario Waterfront. However, some sensitive resources, such as Perch River Wildlife Management Area, Long Point State Park, open waters of Lake Ontario and the St. Lawrence River, the Stone Mills Agricultural Museum and several historic homestead sites within the vicinity of Project site are still indicated as having the potential for at least partial visibility of the Project. Visual simulations prepared for these sites are discussed in Section 3.5.2.2.3 (below) and included in Appendix K.

Areas of actual visibility are anticipated to be more limited than indicated by the vegetation viewshed analysis, due to the slender profile of the turbines (especially the blade, which make up the top 147.5 feet of the turbine), the effects of distance, and screening from hedgerows, street trees and structures, which are not considered in the viewshed analysis. For example, distance affects the apparent size and degree of contrast between an object and its surroundings (see Section 3.5.1.2 for a discussion of distance zones and their effects on visual perception).

3.5.2.2.2 Field Verification

Visibility of the proposed Project was evaluated in the field on December 10 2006, December 30, 2010 and January 11, 2011. The purpose of this exercise was to identify locations with open views toward the Project site and to obtain photographs for subsequent use in the development of visual simulations. During field review crews drove public roads and visited public vantage points within the 10-mile radius study area to document points from which the Project would likely be visible. Photos were taken from 191 representative viewpoints using digital cameras. Viewpoint locations were determined using hand-held global positioning system (GPS) units and high resolution aerial photographs (digital ortho quarter quadrangles). The time and location of each photo were documented on all electronic equipment (cameras, GPS units, etc.) and noted on field maps and data sheets. Viewpoints photographed during field review generally represented the most open, unobstructed available views toward the Project.

Field review confirmed that actual Project visibility is likely to be more limited than suggested by viewshed mapping. This is due to the fact that screening provided by buildings is significant within more developed areas (villages and hamlets), and trees within the study area provide more extensive and effective screening than assumed in these analyses (e.g., vegetation is more extensive than indicated on the USGS NLCD, and often taller than 40 feet in height). The result is that certain sites/areas where "potential" visibility was indicated by viewshed mapping were actually well screened from views of the proposed Project. Field review confirmed a lack of visibility from areas that were heavily forested, and village centers such as Brownville, Chaumont, Clayton, Dexter and LaFargeville, where buildings and street trees screen the Project. Structures also block outward views from the City of Watertown. Views from Fort Drum are generally screened by topography and vegetation, and views from Sackets Harbor are unlikely, except possibly from some waterfront areas with views to the northeast across open water (limited number of locations). In general, shoreline areas along Lake Ontario and the St. Lawrence River were screened from view of the Project site by trees and a rise to topography along the shoreline. The area with greatest Project visibility occurs within two miles of the proposed turbines, including portions of NYS Routes 12 and 180. However,

even in these portions of the study area, hedgerows and trees not indicated on the USGS maps blocked/interrupted views toward the proposed turbines in many areas. Open views (at about 3.5 miles) will also be available from portions of Interstate Route 81. Based on field review at Long Point State Park, some open water areas on Lake Ontario to the southwest have the potential for unscreened views of the Project. These views will be available to recreational boaters, and in many locations will include all of the proposed turbines. Views from the St. Lawrence River (including Wellesley Island) will be much more limited due to the narrower width of this waterway, the more effective screening provided by shoreline trees and topography, and the greater distance from which the Project will be viewed.

A comprehensive summary of potential Project visibility from sensitive sites is presented in Appendix K.

3.5.2.2.3 Visual Simulations

From the photo documentation conducted during field verification, 10 viewpoints were selected for development of visual simulations. These viewpoints were selected based upon the following criteria:

1. They provide clear, unobstructed views toward the Project site.
2. They illustrate Project visibility from sensitive resources with the visual study area.
3. They illustrate typical views from landscape similarity zones where views of the Project will be available.
4. They illustrate typical views of the proposed Project that will be available to representative viewer/user groups within the visual study area.
5. They illustrate typical views of different numbers of turbines, from a variety of viewer distances, and under different lighting conditions, to illustrate the range of visual change that will occur with the Project in place.

Location of the selected viewpoints is indicated in Figure 9 of Appendix K. Locational details and the criteria for selection of each simulation viewpoint are summarized in Table 17.

Table 17. Viewpoints Selected for Simulations and Evaluation

Viewpoint Number	Visually Sensitive Resource	LSZ Represented	Viewer Group Represented	Viewing Distance	View Orientation¹
4	Tracy Farm (NRHP-Listed)	Rural Residential/Agricultural	Local Residents	0.5 mile	W-SW
10	Hamlet of Depauville, NYS Route 12	Village/Hamlet	Local Residents; Travelers/Commuters	0.9 mile	S
35	Perch River WMA (observation platform)	Rural Residential/Agricultural	Tourists/Recreational Users; Local Residents	2.9 miles	W
40	Stone Mills Agricultural Museum, Stone Mills Union Church (NRHP-Listed)	Rural Residential/Agricultural	Tourists/Recreational Users; Local Residents	2.2 miles	W
61	Perch River WMA (ice-fishing access, Perch Lake)	Water/Waterfront	Tourists/Recreational Users	5.7 miles	W
67	NYS Route 12	Rural Residential/Agricultural	Local Residents; Travelers/Commuters	0.9 mile	E-SE
70	Village of Chaumont, NYS Route 12E (Great Lakes/Seaway Trail National Scenic Byway), Chaumont River	Water/Waterfront; and Village/Hamlet	Local Residents; Travelers/Commuters	4.5 miles	NE
74	Long Point State Park, Lake Ontario/Chaumont Bay	Water/Waterfront	Tourists/Recreational Users	9.1 miles	NE
102	Wellesley Island, Thousand Island Park Historic District, Saint Lawrence River	Water/Waterfront	Tourists/Recreational Users; Local Residents	9.1 miles	S
110	-	Rural Residential/Agricultural	Local Residents	2.4 miles	E

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

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 turbines from each of the 10 selected viewpoints. The photographic simulations were developed by constructing a three-dimensional computer model of the proposed turbine and turbine layout in 3D

StudioMax® based on turbine specifications and survey coordinates of the proposed facility. For the purposes of this analysis, it was assumed that all new turbines would be Gamesa G90 machines.

Simulations of the proposed Project indicate that the visibility and visual contrast presented by the wind turbines will be highly variable based on landscape setting, extent of natural screening, presence of other man-made features in the view, weather and meteorological conditions, viewer sensitivity, and distance of the viewer from the Project. Visual contrast is most apparent in mid-ground views where the turbines scale contrast is most notable, and in views where large numbers of turbines are visible and/or land use contrast is apparent. More distant views, and those that include significant screening generally have more limited visual impact. These factors tend to decrease turbine visibility and/or contrast with the landscape.

3.5.2.2.4 Potential Visual Impact Evaluation

Based on NYSDEC's Visual Policy, visibility alone of the Project from any of the potentially affected resources does not necessarily result in detrimental effect on the perceived beauty of the place or structure. In order to assess the relative impact of the Project on resources, a panel of three registered landscape architects (LA) evaluated the visual impact of the proposed Project on the existing visual landscape in terms of its contrast with existing components of the landscape. Digital color prints (11 x 17-inch) of the before and after photos from each selected viewpoint were evaluated, assigning each view quantitative visual contrast ratings on a scale of 0 (insignificant) to 4 (strong contrast). Results of that evaluation are presented in Table 18.

Table 18. Visual Contrast Rating Results

Viewpoint #	Distance (Nearest Turbine in View)	Landscape Similarity Zone (LSZ)	Individual Overall Scores ¹			Composite Score
			LA 1	LA 2	LA 3	
4	0.5 mile	Rural	0.9	2.0	3.2	2.0
10	0.9 mile	Residential/Agricultural	1.5	1.3	3.4	2.1
35	2.9 miles	Village/Hamlet	1.8	2.3	3.1	2.4
40	2.2 miles	Rural	0.4	1.4	3.7	1.8
61	5.7 miles	Residential/Agricultural	0.3	2.5	1.7	1.5
67	0.9 mile	Water/Waterfront	0.7	2.5	3.8	2.3
70	4.5 miles	Rural	0.1	0	0.5	0.2
74	9.1 miles	Water/Waterfront	0.4	2.6	2.8	1.9
102	9.1 miles	Water/Waterfront	0	0	0.2	0.1
110	2.4 miles	Rural	0.5	1.1	2.1	1.2
Average			0.7	1.6	2.5	1.6

¹On a scale of 0 (completely compatible) to 4 (incompatible).

Panel evaluation of the simulations indicated that the Project's overall impact on scenic quality within the visual study area is likely to be moderate. Of the 10 simulations evaluated, seven (70%) received a composite contrast rating of between 1.5 and 2.4 on a scale of 0 (insignificant) to 4 (strong), and the composite average score was 1.6 for all viewpoints evaluated. The highest individual and composite contrast ratings were received by views where the turbines presented appreciable scale, color, and/or line contrast, or were perceived as changing the existing land use. Turbine visibility against the sky, scale contrast with the existing vegetation, line contrast with the horizontal landform, and creation of a new focal point in the view were also indicated as factors that contributed to visual contrast. At greater distances, and with more screening, the contrast/impact of the Project was significantly reduced. However, there was a high degree of variability among the panel members' ratings, with the individual members reacting quite differently to individual simulations (see rating forms in Appendix K). Two panel members (LA1 and LA2) rated the Project as having a generally minimal to moderate contrast with the existing landscape, while the third (LA3) generally considered contrast to be more appreciable to strong. This likely reflects individual variability in perception/acceptance of the turbines. Similarly, public reaction to the Project is likely to be highly variable based on proximity to the turbines, the affected landscape, and personal attitude of the viewer regarding wind power.

As noted in the NYSDEC Visual Policy, significant visual impacts are those that cause a diminishment of the public enjoyment and appreciation of the identified resource or one that impairs the character or quality of such place. The panel evaluation generally does not indicate that an impact of this magnitude is likely. It is also worth noting that the panel's evaluation does not account for the distractions and ameliorating effects of less favorable atmospheric viewing conditions, which are predominant in this region. In addition, the simulated views do not account for the fact that in a "real world" view there are numerous other distractions that can reduce visual contrast and compete for the viewer attention. This serves to further reduce potential impacts resulting from the distant background views of the turbines. In any event, it is not anticipated that distant views to the wind farm will impair the use of the majority of sensitive resources identified within the study area. Most waterfront locations, including parks, are oriented to provide scenic views of the water which places the turbines behind the typical viewer (in most cases). In addition, although recreational users are considered sensitive to visual impact, those who are engaged in active recreational activities (e.g., boating, waterskiing, snowmobiling, etc.) or hunting, which are dominant activities in the study area, are unlikely to stop participating in these activities, or seek out new locations for these activities, or experience diminished enjoyment of these activities with the proposed Project in place.

3.5.2.2.5 Assessment of Shadow Flicker

In addition to the VIA, EDR conducted a separate assessment of the phenomenon known as "shadow flicker" (Appendix L). Shadow flicker is the alternating change in light intensity or shadows created by the moving turbine blades when back-lit by the sun. These flickering shadows may be perceived by some as annoying when cast on nearby residences; however, due to the turbines' low blade pass frequency, shadow flicker is not anticipated to have any adverse health effects (e.g., trigger epileptic seizures).

EDR used the following data to evaluate potential impacts related to shadow flicker:

- Proposed turbine locations (coordinates)
- Shadow flicker receptor (residence) locations (coordinates) within 1,000 meters of a turbine
- USGS 1:24,000 topographic and USGS DEM (height contours)
- Turbine rotor diameter and hub height for both of the turbines under consideration for the Project (Gamesa G-90 and G-97)
- Joint wind speed and direction frequency distribution
- Sunshine hours (long term monthly reference data)

For both turbine models, the model calculated shadow-flicker time at each assessed receptor location within 1,000 meters (3,281 feet) of a proposed turbine. This distance is the industry standard for shadow flicker studies, and exceeds the 10-rotor diameter distance (900m for the Gamesa G90 and 970m for the Gamesa G97) beyond which shadow flicker is essentially undetectable (U.S. Department of the Interior, 2005; BERR, 2009). The model presents the amount of shadow-flicker time (hours/year) in the areas surrounding the Project as an iso-line plot for each of the turbine models being considered.

Based on the shadow flicker analysis, of the 392 structures identified within 3,281 feet (1,000 meters) of any turbine, the following results are predicted:

Gamesa G-90 (90 meter rotor on 100 meter tower):

- 238 (61%) will experience no shadow flicker,
- 2 (1%) may be affected by >1 hour/year,
- 78 (20%) may be affected 1-10 hours/year,
- 54 (14%) may be affected 10-20 hours/year,
- 15 (4%) may be affected 20-30 hours/year,
- 5 (1%) may be affected by more than 30 hours/year (none by more than 37 hours/year).

Gamesa G-97 (97 meter rotor diameter on 90 meter tower):

- 237 (60%) will experience no shadow flicker,
- 1 (>1%) may be affected by >1 hour/year,
- 71 (18%) may be affected 1-10 hours/year,
- 56 (14%) may be affected 10-20 hours/year,
- 17 (4%) may be affected 20-30 hours/year,
- 10 (3%) may be affected by more than 30 hours/year, (none by more than 42 hours/year).

All shadow flicker receptors and the hours of shadow flicker they are predicted to receive are indicated in tables and maps included in Appendix L.

No consistent national, state, county, or local standards exist for allowable frequency or duration of shadow flicker from wind turbines at the proposed Project site. In general, quantified limits on shadow flicker are uncommon in the United States (USDOE, 2010). However, standards developed

by some states and countries provide guidance in this regard. A model wind ordinance prepared by the North Carolina Wind Working Group in 2008 suggests a limit of 30 hours per year at any occupied building on a non-participating landowner's property (NCWWG, 2008). The Ohio Power Siting Board has also used 30 annual hours of shadow flicker as a threshold of acceptability in reviewing commercial wind power projects (OPSB, 2008). Additionally, international guidelines from Europe and Australia have suggested 30 hours of shadow flicker per year as the threshold of significant impact, or the point at which shadow flicker is commonly perceived as an annoyance (NRC, 2007). Thirty hours per year equates to approximately 0.7% of the total daylight hours in a year (approximately 4,461 hours) at the latitude and longitude of the Project site. As indicated above, using the Gamesa G-90, five of the 392 inventoried receptors are predicted to exceed the threshold of 30 hours of shadow flicker per year. Using the Gamesa G-97, 10 of the 392 inventoried receptors are predicted to receive in excess of 30 hours of shadow flicker per year.

3.5.3 Mitigation

Construction-related visual impacts will be avoided, minimized, and mitigated through 1) careful site planning/project layout, 2) development and implementation of various construction plans, and 3) a comprehensive site restoration process following completion of construction.

The proposed Project layout was developed so as to minimize the need for tree clearing and new road construction. The majority of the proposed access roads and turbines have been sited in open fields (agricultural and successional). Existing farm lanes will be upgraded for use as turbine access roads wherever possible, and buried collection lines will follow access roads to minimize required clearing. Where clearing of undisturbed forest is unavoidable, such sites are typically well removed from public roads and residences and therefore will not result in a significant adverse visual impact.

During construction, visual impacts associated with working construction equipment will be minimized through adherence to a construction routing and sequencing plan that minimizes impacts on local roads and residences. A dust control plan and a sediment and erosion control plan will be developed and implemented as described in Sections 3.4.3 and 2.7 respectively, to minimize off-site visual impacts associated with construction activities. As described in the impacts discussion, any unavoidable construction-related visual impacts will be short term.

Following completion of construction, site restoration activities will occur. These will include removal of access road material from Project access roads (i.e., going from approximately 50 feet to 16-25 feet in width), restoration of agricultural fields (including soil de-compaction, rock removal, and

topsoil spreading – see Section 2.0), and re-vegetating/restoring disturbed sites through seeding and mulching. Because removal of mature trees along the access roads and along public roads is anticipated to be minimal, no tree planting is proposed as mitigation for construction-related visual impacts. Because Project access roads will receive very limited use once construction is complete, they will take on the appearance of farm roads, similar to those that currently are present within the area. These actions will assure that, as much as possible, the site is returned to its preconstruction condition and that long-term visual impacts are minimized.

The NYSDEC Visual Policy states that only where “significant impacts are identified” by the visual assessment is the applicant required to employ reasonable and necessary mitigation measures. The contrast rating panel included in the Visual Assessment for this Project (Appendix K) indicates that in most cases the Project is not expected to result in diminishment of the public enjoyment and appreciation of identified sensitive locations or impair the character or quality of such places. Nonetheless, the NYSDEC Visual Policy provides typical mitigation options that “may reduce or eliminate the visibility of the project or alter the project’s effect on the scenic or aesthetic resource in some way”. The applicability of these mitigation options were evaluated and are summarized below.

Mitigation options for the operating Project are limited, given the nature of the Project and its siting criteria (tall structures in open areas). It is also worth noting that for many individuals, views of wind power projects are not necessarily considered an adverse impact that requires mitigation (Warren, et al., 2005). However, in accordance with NYSDEC Program Policy (NYSDEC, 2000), various mitigation measures were considered. These included the following:

- A. Professional Design. All turbines will have uniform design, speed, color, height and rotor diameter. Towers will 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, selective off-site planting could be effective in screening views from some historic sites in the area. A visual mitigation planting fund could be established to screen views of the Project from NHRP-listed or eligible historic sites within the study area.

- C. Relocation. The Project is sited to access favorable elevation and maximize exposure to prevailing winds. These reliable winds meet the necessary criteria for a commercially viable wind energy Project. Because of the extent of the Project, the number of individual turbines, and the variety of viewpoints from which the Project can be seen, turbine relocation will generally not significantly alter visual impact. Where visible from sensitive resources within the study area, multiple turbines will typically be visible, and relocation of individual machines would have little effect on overall visual impact. Throughout the study area, views of the Project are highly variable and include different turbines at different vantage points. Additionally, the Project layout has been designed in compliance with all required set-backs from roads and residences. Options for relocation of individual Project components are constrained by compliance with setback requirements. Moreover, turbine relocation is likely to impact a number of other existing environmental constraints which have been considered in choosing the current location of turbines. Therefore, turbine relocation would generally not be effective in mitigating visual impacts.
- 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. Consequently it is recommended that this color be utilized on the Horse Creek Project. The size and movement of the turbines prevents more extensive camouflage from being a viable mitigation alternative (i.e., they cannot be made to look like anything else). Other components of the Project have been designed to minimize contrast with the existing agricultural character in the Project area. These measures will include the design of the Project operations and maintenance building, which although not yet designed will reflect the vernacular architecture of the area (i.e., the building will resemble an agricultural structure). Additionally, new road construction will be minimized by utilizing existing farm lanes wherever possible.
- E. Low Profile. A significant reduction in turbine height is not possible without significantly decreasing power generation. To off-set this decrease, additional turbines would be necessary. There is not adequate land under lease to accommodate a significant number of additional turbines, and a higher number of shorter turbines would not necessarily decrease Project visual impact. In fact, 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). The visual impact of the electrical collection system is being minimized by placing the majority of the collection system underground. Although the final locations of poles and pole design is not yet determined, based upon overhead line routing,

these poles will be obscured from many viewpoints within the Project area by trees or other vegetation.

- F. Downsizing. Reducing the number of turbines could reduce visual impact from certain viewpoints, but from most locations within the study area where numerous turbines are visible, the visual impact of the Project would change only marginally. As discussed in more detail in the Alternatives section of the DEIS (Section 5.0), a dramatic reduction in turbine number (e.g., reduction by 50%) would significantly reduce the socioeconomic benefits of the Project and reduce the Project's ability to assist the State in meeting State energy policies objectives and goals.
- G. Alternate Technologies. Alternate technologies for power generation would have different, and perhaps more significant, visual impacts than wind power. Alternative utility-scale wind power technologies (e.g., vertical axis turbines), that could reduce visual impacts, are not commercially available.
- H. Nonspecular Materials. Non-reflective paints and finishes will be used on the wind turbines to minimize reflected glare. Nonspecular conductor will be used on the above-ground sections of the electrical collection system.
- I. Lighting. Turbine lighting will be kept to the minimum allowable by the FAA. Current FAA guidelines (FAA, 2005) do not require daytime lighting, and allow nighttime lighting of perimeter turbines only, at a maximum spacing of 0.5 mile. 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 from ground-level vantage points. Lighting at the substation will be kept to a minimum, and tuned 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 (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. Historic structure restoration/maintenance activities could be undertaken to off-set potential visual impacts on cultural resources.

Regarding potential shadow-flicker impacts, additional investigation of the receptors that could receive more than 30 hours of shadow flicker annually will be undertaken. This investigation will determine if site-specific conditions (building/window orientation, tree screening, etc.) will prevent or reduce the predicted impact. In instances where such mitigating factors are not present, mitigation for potential shadow flicker impacts will be provided by the Project sponsor through the purchase of landscape screening (trees, shrubs) or window treatment such as curtains, blinds, or shutters.

3.6 SOUND

The sound or noise produced during construction and operation of wind power projects can be a significant concern to local residents. Noise is defined as any loud, discordant or disagreeable sound or sounds. More commonly, in an environmental context, noise is defined simply as unwanted sound. Certain activities inherently produce sound levels or sound characteristics that have the potential to create noise. The sound generated by proposed or existing facilities may become noise due to land use surrounding the facility, if these lands contain residential, commercial, institutional, or recreational uses, and the sound is perceived as noise by the users of the adjacent lands (NYSDEC, 2001).

To obtain background sound levels and evaluate potential sound impacts from the Project, an *Acoustical Analysis* was prepared by CH2MHILL (Appendix N; CH2MHILL, 2011). The two primary phases of the study included a background sound level survey and a computer modeling analysis of anticipated Project operation sound levels, which were compared to the noise thresholds set forth in the Town of Clayton Wind Energy Facilities law (TBTC, 2007) and NYSDEC guidelines (NYSDEC, 2001).

Acoustical terms used in this section are defined as follows (CH2MHILL, 2011; TBTC, 2007):

- *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.

In order to provide a frame of reference for noise levels presented in the following discussion, Table 19 lists examples of common noise sources and their respective dBA levels.

Table 19. Common Sources of Noise and Associated Typical Noise Levels (dBA)

Source/Activity	Indicative noise level (dBA)
Threshold of hearing	0
Rural night-time background	20-40
Quiet bedroom	35
Wind farm at 350m	35-45
Car at 40 mph at 100m	55
Busy general office	60
Truck at 30 mph at 100m	65
Pneumatic drill at 7m	95
Jet aircraft at 250m	105
Threshold of pain	140

Source: The Scottish Office, Environment Department, Planning Advice Note, PAN 45, Annex A: Wind Power, A.27. Renewable Energy Technologies, August 1994. Cited in "Noise from Wind Turbines," British Wind Energy Association, <http://www.britishwindenergy.co.uk/ref/noise.html>.

3.6.1 Existing Conditions

The Project site is a rural, agricultural area with generally low ambient noise levels. Environmental variables that are expected to affect existing noise levels include the rustling of trees, wind blowing over fields of corn or grass, vehicle use on local roads, tractor/farming activity, and inclement weather (rainstorms and thunder). CH2MHILL measured the existing sound environment within the Project area during a two-week period (between November 13 and December 1, 2010) when leaves on the trees were minimal. In the winter when deciduous trees are bare of leaves, ambient sound level is generally lower, because rustling leaves and insect/bird sounds are absent, resulting in

relatively low sound levels compared to other seasons. Therefore, by capturing the lowest level of natural masking noise that could hide or obscure potential noise from wind turbines, measurements taken during leaf-off conditions represent a conservative, worst-case scenario for modeling future noise impacts.

Ambient sound levels within the Project area were measured using Larson Davis 824 and 820 Type 1 (precision) sound level meters. All equipment had been factory calibrated within the previous 12 months and field calibrated both before and after the measurement period. Ambient sound level measurements were collected in 10-minute intervals six representative locations, which are distributed over the Project area and beyond (Monitoring Locations are depicted in Appendix N). The average ambient nighttime noise level (L_{eq}) under cut-in and full output hub height wind speeds at each of the six monitoring locations is listed in Table 20. The range of sound levels recorded at each monitoring location reflect typical variability within the Project area resulting from a variety of factors. These include that ambient sound levels generally increase with increasing wind speed, nighttime sound levels were generally less than daytime sound levels, and locations along more heavily traveled roadways generally had higher sound levels than locations on less traveled roadways.

Table 20. Summary of Ambient Nighttime L_{eq} Noise Levels (dBA)

Monitoring Location ID	L_{eq} Noise Level at Cut-in Wind Speeds (4.3 m/s)	L_{eq} Noise Level at Full Output Wind Speeds (8.7 m/s)
22	27 – 51	26 – 47
45	25 – 42	24 – 46
87	46 – 58	40 – 57
166	27 – 41	24 – 41
190	34 – 49	31 – 49
396	27 – 44	25 – 40

3.6.2 Potential Impacts

Virtually everything that has moving parts will make some sound, including wind turbines. No completely satisfactory way exists to measure the subjective effects of noise, or to measure the corresponding reactions of annoyance and dissatisfaction. This lack of a common standard is primarily due to the wide variation in individual thresholds of annoyance and habituation to noise. Thus, an important way of determining a person’s subjective reaction to a new noise is by comparing it to the existing or “ambient” environment to which that person has adapted. The NYSDEC Program

Policy Memorandum, “Assessing and Mitigating Noise Impacts” (NYSDEC, 2001) suggests that new noise level increases exceeding 6 dBA above ambient should be assessed for adverse impacts. The Town of Clayton’s Wind Energy Facilities Law (TBTC, 2007) requires that the Project operate so that the maximum noise generated shall not exceed 50 dBA, as measured at offsite residences, schools, hospitals, churches, or public libraries. In the NYSDEC guidance this noise level is described as “quiet”.

In general, the more the level or the tonal (frequency) variations of a noise exceeds the previously existing ambient noise level or tonal quality, the less acceptable the new noise will be, as judged by the exposed individual. The general human response to changes in noise levels that are similar in frequency content (for example, comparing increases in continuous (L_{eq}) traffic noise levels) are summarized below (NYSDEC, 2001):

- A 3-dB change in sound level is considered a barely noticeable difference
- A 5-dB change in sound level will typically be noticeable
- A 10-dB change is considered to be a doubling in loudness

The potential noise-related impacts resulting from the construction and operation of the Project is described below.

3.6.2.1 Construction

Construction of wind power projects requires the operation of heavy equipment and construction vehicles for various activities including construction of access roads, excavation and pouring of foundations, the installation of buried and above ground electrical interconnects, and the erection of turbine components. These activities, although temporary, will produce the following types and levels of noise:

Truck traffic and heavy equipment operation: Heavy equipment, gravel, concrete and the wind turbine components must be delivered to the site by large trucks (including dump trucks, cement mixers, and tractor-trailers). Heavy equipment utilized on a wind power project includes bulldozers and rollers during site preparation and road construction, backhoes, hoe rams, and pneumatic jacks during foundation excavation, and cable plows, trenchers, and backhoes during electrical cable installation. A large erection crane is used to install the nacelle and rotor atop the turbine tower. Sound generated by truck traffic and heavy equipment ranges from 83 to 91 dBA at a distance of 50

feet (USEPA, 1971). This Project related sound will be intermittent and of short term duration – generally occurring during Project construction.

Blasting: Although not anticipated on this Project, blasting could be required if the turbines are being installed in areas where bedrock is close to the surface and cannot be broken up by other means. More frequently, foundation holes 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.

Table 21 below shows the total composite noise level at a reference distance of 50 feet, based on the pieces of equipment operating for each construction phase and the typical usage factor for each piece. The noise level at 1,500 feet is also shown, which is likely a conservative prediction, because the only attenuating mechanism considered was geometric spreading, which results in an attenuation rate of 6 dBA per doubling of distance. However, attenuation related to the presence of sound dampening structures such as buildings, trees or vegetation, ground effects, and terrain was not considered.

Table 21. Composite Construction Site Noise Levels

Construction Phase	Composite Equipment Noise Level at 50 feet, dBA	Composite Equipment Noise Level at 1,500 feet, dBA
Clearing	88	58
Excavation	90	60
Foundation	89	59
Erection	84	54
Finishing	89	59

Noise from construction-related activities may cause some temporary annoyance at residences within and adjacent to the Project site. In some places these activities will occur relatively close to existing residences and, at distance of 1,500 feet, a total sound level ranging from 54 to 60 dBA might occur over several working days. Such levels would generally be unacceptable if they were occurring on a permanent basis or outside of normal daytime working hours. However, as a temporary, daytime occurrence, construction sound of this magnitude may well go unnoticed by

many residents in the Project site as construction-related noise will not be significantly louder than everyday noise sources such as farm equipment and vehicles passing on the road.

3.6.2.2 Operation

The sources of sounds emitted from operating wind turbines can be divided into two categories: 1) mechanical sounds, from the interaction of turbine components, and 2) aerodynamic sounds, produced by the flow of air over the blades (NRC, 2007:157; Rogers et al., 2006). Mechanical sounds originate from the relative motion of mechanical components and the dynamic response among them. Since the emitted sound is associated with the rotation of mechanical and electrical equipment, it tends to be tonal (of a common frequency), although it may have a broadband component. Aerodynamic broadband sound is typically the largest component of wind turbine acoustic emissions, and is generally characterized as a “swishing” or “whooshing” sound. It originates from the flow of air around the blades, and generally increases with rotor speed.

In order to quantitatively look at potential impacts in absolute terms, a modeling study of worst-case Project sound levels was carried out to determine what specific sound levels could be expected at the nearest receptors. The *Acoustical Analysis* prepared by CH2MHILL (Appendix N; CH2MHILL, 2011) predicted operational sound from the built Project in order to evaluate potential impacts on adjacent residential structures. The noise analysis was conducted using standard acoustical engineering methods and in strict accordance with the international standards including ISO 9613, *Acoustics – Sound Attenuation during Propagation Outdoors* (ISO, 1993) and VDI 2714, *Outdoor Sound Propagation* (VDI, 1988). ISO 9613-2 (entitled “Part 2: General Method of Calculation”; ISO, 1993) is the primary worldwide standard for such calculations. The analysis was conducted using the following assumptions:

- “Standard Day” Conditions – The model assumes atmospheric absorption for a typical day as defined in ISO 9613-1 (entitled “Part 1: Calculation of the Absorption of Sound by the Atmosphere”; ISO, 1993) with conditions of 10°C and 70% relative humidity.
- Wind Direction – The model assumes a hypothetical situation where wind is blowing from all directions at the same time.
- Critical Wind Speed – The maximum sound power levels used in the analysis are generally realized at wind speeds of 6 m/s (13.4 mph) or greater; this speed represents the point where the least amount of masking noise is likely to be present relative to the turbine sound level.

- Wintertime Background Levels – The background survey was conducted under wintertime (leaf-off) conditions when ambient levels are normally at an annual minimum (without leaves rustling or summer insects/birds)
- Conservative L₉₀ Background Level – The L₉₀ is a measurement that represents the noise level that is exceeded during 90% of the measurement period. By definition, a higher background sound level will actually exist most of the time (90% of the time).
- Low Ground Porosity – Wooded areas and fields are normally more acoustically absorptive than assumed in the model.
- Observer Outside – The plotted sound levels assume that the receptor is located outside; sound levels inside of any dwelling will be 10 to 20 dBA lower.

In the model, each proposed wind turbine was considered to be a point source of noise at the hub height with an overall sound power level of 108 dBA under full power conditions. This overall sound power level represents the maximum turbine noise level determined in accordance with IEC61400-11, *Wind Turbine Generator Systems—Part 11: Acoustic Noise Measurement Techniques* (IEC, 2006) and includes a +2 dBA adjustment to account for typical vendor warranty or declared sound power levels. The majority of turbines are anticipated to operate at their expected value while a more limited number may operate above or below this expected value. Although it is statistically unlikely that all of the turbines would simultaneously operate above the expected sound power range for a Gamesa G90 turbine of 106 dBA, the +2 dBA adjustment (108 dBA) was included in the model to ensure a conservative analysis. The combination of the modeling parameters used and the inclusion of the +2 dBA term are expected to result in a reasonable and conservative assessment of the maximum project levels. When winds are slower than those that correspond to maximum noise emissions, the noise levels will be less.

The transmission line is 115-kilovolt (kV), therefore audible corona noise is anticipated to be negligible (corona noise generally is associated with voltages exceeding 345 kV). Transformers are expected to have a National Electrical Manufacturers Association (NEMA) sound rating of 87 dBA.

Compliance with the Town of Clayton Wind Energy Facilities Law

The Town of Clayton’s Wind Energy Facilities Law states that the “sound level statistical sound pressure level (L₁₀) due to any [wind turbine] operation shall not exceed 50 dBA when measured at any off-site residence, school, hospital, church or public library” (TBTC, 2007:§15.A). The predicted Project noise levels under full power conditions are depicted in Appendix N: Figure 1. No residences/receptors are predicted to exceed the local ordinance threshold of 50 dBA, even at

participating homes, during full power conditions. Lower sound levels should be anticipated when turbines are operating in a reduced power mode.

Conformance with NYSDEC Guidelines

The New York State Department of Environmental Conservation (NYSDEC) published guidance “Assessing and Mitigating Noise Impacts” (NYSDEC, 2001) does not provide quantitative noise limits but its key recommendations are briefly summarized below:

- New noise sources should not increase noise level above 65 dBA in non-industrial areas.
- The U.S. Environmental Protection Agency (EPA) found that 55 L_{dn} was sufficient to protect public health and welfare, and in most cases did not create an annoyance. (55 L_{dn} is equal to a continuous level of 49 dBA)
- Sound level increases of more than 6 dB may require a closer analysis of impact potential depending on existing sound levels and the character of surrounding land use and receptors.
- In determining the potential for an adverse noise impact, consider not only ambient noise levels, but also the existing land use, and whether or not an increased noise level or the introduction of a discernable sound that is out of character with existing sounds will be considered annoying or obtrusive.
- Any unavoidable adverse effects must be weighed along with other social and economic considerations in deciding whether to approve or deny a permit.

The NYSDEC guidance states that the L_{eq} “provides an indication of the effects of sound on people (and is) useful in establishing the ambient sound levels” and the L_{90} is “often used to designate the background noise level”. The guidance also indicates “quiet seemingly serene setting such as rural farm land” will be 45 dBA while wilderness areas will be 35 dBA. As indicated in Appendix N, the winter time ambient levels for the Project area were found to fluctuate from less than 25 to over 50 dBA and nighttime levels were generally less than daytime levels. The fluctuation in existing ambient noise level is a function of many factors including but not limited to weather, wind conditions, presence of other noise sources (such as, road, rail and air traffic, wildlife (birds, insects and domestic dogs).

The *Acoustical Analysis* for the Project (Appendix N; CH2MHILL, 2011) acknowledges that NYSDEC’s guideline for additional analysis (a 6 dBA increase over ambient) will be exceeded in some conditions. It is also acknowledged that ambient levels were found to vary over a wide range. As noted above, the NYSDEC guidance suggests that sound levels for wilderness areas will typically

be 35 dBA while rural farm land will be 45 dBA. The Project area is clearly more rural farmland than wilderness, and consistent with the NYSDEC guidance, we have determined an approximate baseline of 37 dBA as the ambient condition in this assessment. This level falls between NYSDEC's suggested ambient levels for wilderness areas and rural farm land; and also corresponds to the average median L_{eq} for the wind speed corresponding to 8.7 m/s, the wind speed at which the turbine emit their full sound level. Therefore, the area of potential increases exceeding the 6 dBA guideline may at times be approximated by the 45 dBA contour depicted in Appendix N: Figure 1. It is important to note that this is representative of an expected project level of 43 dBA as the contours include a +2 dBA adjustment to the turbine sound power level (this was to clearly document that Project related sound levels are expected to satisfy the Town's 50 dBA requirement).

As to the additional analysis suggested in the NYSDEC guidance for areas exceeding the 6dBA threshold, we note that the NYSDEC's guidance states that "This guidance does not supersede any local noise ordinances or regulations." Accordingly, the Project must be operated in a manner which will comply with the noise ordinance limit of 50 dBA at sensitive receptors. The noise ordinance requirement is less than NYSDEC maximum guideline of 65 dBA for non-industrial settings. Moreover, as noted in Table E of the NYSDEC guidelines, the Project's maximum sound levels of 30 to 50 dBA at sensitive receptors, are considered "very quiet" to "quiet", respectively. It is acknowledged that such qualitative descriptions will vary among individuals and may be influenced by both acoustic and non-acoustic factors.

Based on this analysis, overall impacts from operational noise are not expected to be significant throughout the Project site. Nevertheless, some residents may find some dissatisfaction with the audible noise produced by the Project.

3.6.3 Proposed Mitigation

Although residential sound impacts are likely minor (and in no case are noise levels anticipated to exceed the locally established threshold of 50 dBA), mitigation measures for potential construction and operational impacts are proposed to include the following:

- Pursuing good neighbor agreements and/or noise easements with property owners of residences that fall within the area of predicted potential 6 dBA increase over ambient sound levels.

- Limiting hours of construction to between 7 a.m. and 7 p.m., Monday through Friday (in accordance with the Town of Clayton Wind Energies Facilities Law, §12.O). This includes conducting the noisiest activities between the hours of 8 a.m. and 5 p.m.
- Implementing best management practices for noise abatement during construction, including use of appropriate mufflers.
- Notifying landowners by mail or phone at least one week in advance of certain construction noise impacts (e.g., blasting, pile driving).
- Locating stationary construction equipment (air compressors/generators) as far away from residences as feasible. When possible, utilize equipment in acoustically designed enclosures and/or erect temporary barriers.
- Implementing a complaint resolution procedure to assure that any complaints regarding construction or operational noise are adequately and efficiently investigated and resolved.

3.7 TRANSPORTATION

The Project area is served by a network of state, county, and local roadways. Roads range from two-lane highways with paved shoulders to seasonally maintained, dirt/gravel roads. Wind power generating projects have the potential to create transportation impacts as a result of short-term construction activities (temporary impacts) and as a result of long-term operation and maintenance of the Project (permanent impacts). To evaluate the potential temporary and permanent impacts resulting from the proposed Project, Creighton Manning Engineers (CME) conducted a Route Evaluation Study in 2007. The purpose of this evaluation is to document the existing transportation conditions and identify probable travel routes, constraints, and proposed improvements. The Route Evaluation Study is included as Appendix O. In addition, Fisher Associates (FA) prepared a Structures Inventory and Assessment in 2010, which reviewed the existing bridge and drainage structure conditions along the proposed hauling route within the Project area and identified potential impacts and mitigation measures. The Structures Inventory and Assessment is included as Appendix P. Together, these studies provide a comprehensive inventory of transportation resources in the Project area (for all project alternatives considered), allow for quantitative and qualitative assessment of potential adverse impacts resulting from project construction and operation, and identify measures that adequately mitigate for unavoidable impacts.

3.7.1 Existing Conditions

CME conducted a field inventory and visual assessment and prepared a photo log of potential Project transportation routes within the study area. Included in this inventory is documentation of roadway characteristics and conditions. Table 22 provides a summary of the existing road conditions in the study area in terms of width, surface and posted traveling speed.

Table 22. Existing Road Characteristics

Road	From	To	Lane Width	Pavement Condition	Surface Type	Speed Limit
<i>State Roads</i>						
NY Route 3	Oswego	NY Route 180	24	Good	Asphalt	55-mph
NY Route 12	I-81 Exit 46	County Route 12	24	Good	Asphalt	55-mph
NY Route 12F	NY Route 180	I-81 Exit 46	24	Good	Asphalt	55-mph
NY Route 180	County Route 54	Dutch Gap Rd.	22	Good	Asphalt	55-mph
NY Route 180	NY Route 3	NY Route 12F	24	Good	Asphalt	55-mph
NY Route 342	I-81 Exit 48	NY Route 12	24	Good	Asphalt	55-mph
<i>County Roads</i>						
Route 12	NY Route 12	NY Route 180	20	Fair	Asphalt	Not Posted
Route 54	NY Route 180	Factory St.	20	Fair to Good	Asphalt	Not Posted
<i>Local Roads</i>						
Herbretch Rd.	NY Route 180	Woodard Rd.	14	Poor	Asphalt	Not Posted
Woodard Rd.	NY Route 12	NY Route 180	16	Fair	Asphalt	Not Posted
Tubolino Rd.	Miller Rd.	Woodard Rd.	16	Fair	Asphalt	Not Posted
Miller Rd.	NY Route 12	Hart Rd.	16	Fair	Asphalt	Not Posted
Lowe Rd.	County Route 54	NY Route 12	17	Poor	Asphalt	Not Posted
Sternberg Rd.	Lowe Rd.	Morris Tract Road	16	Fair to Poor	Asphalt	Not Posted
Hart Rd.	NY Route 12	Miller Rd.	16	Fair	Asphalt	Not Posted
Fox Corners Road	NY Route 12	NY Route 180	20	Fair to Good	Asphalt	Not Posted
Morris Tract Road	County Route 54	Fox Corners Road	18	Fair	Gravel/Asphalt	Not Posted
Haller Rd.	Dutch Gap Rd	County Route 12	17	Fair to Good	Asphalt	Not Posted
Wilder Rd.	County Route 12	Hart Rd.	17	Poor	Asphalt	Not Posted

Source: CME, 2007

FA conducted a site visit to compile an inventory of all the existing drainage structures in the Project area. In the Structures Inventory and Assessment, FA identified 30 different drainage structures within the Project area. Drainage structures with a span length greater than twenty feet were considered bridges. Each bridge is identified in the 2010 New York State Department of Transportation (NYSDOT) bridge inspection inventory by the Bridge Identification Number (BIN). There were three bridge structures reviewed as part of their study.

- BIN 3367270 – County Route 54 over Horse Creek;
- BIN 1077370 – Route 180 over Stone Mills Creek; and
- Bin Unknown – County Route 12 over Unnamed Stream.

The only bridge identified on the proposed hauling route is BIN 3367270 (CR 54 over Horse Creek). This structure is comprised of twin 96 inch corrugated metal pipes (CMP). Exact truck configurations for this Project are unavailable. However, based on typical trucks associated with other wind projects, it is anticipated that this structure will withstand the proposed hauling loads since the structure is buried under three feet of cover.

As part of the on-site inventory, it was assumed that all drainage structures with less than two feet of cover could potentially incur damage during construction. Table 23 below provides a summary of additional characteristics identified in the drainage structure inventory. See the full table included as Exhibit 3 and the location of these structures in Appendix P.

Table 23. Drainage Structure Inventory

ID	Type	Size (inches)	Cover (feet)	Length (feet)	Culvert Condition	Road Width	Road Type	Road Name	Concern
1	Twin CMP	96	3.0	60	Good	18	Asphalt	CR 54	None
2	CMP	36	3.0	28	Good	18	Asphalt	CR 54	None
3	Concrete Box	10'x6'	0.5		Good	30	Asphalt	CR 54	
4	Concrete Box	10'x6'	0.5		Good	30	Asphalt	CR 54	Cover
5	CMP	96	2.0	49	Good	18	Asphalt	Sternberg	Cover
6	Twin CMP	48	1.5	60	Good		Asphalt	Fox Corners Road	None
7	CMP	36	15.0	95	Fair	24	Asphalt	SR 12	Cover
8	CMP	36	15.0	95	Fair	24	Asphalt	SR 12	None
9	Concrete Box	3'x5'	1.0	54	Fair	24	Asphalt	SR 12	None
10	Twin CMP	84	5.0	55	Good	24	Asphalt	SR 12	Cover
11	CMP	72	0.5	34	Fair	16	Asphalt	Lowe	None
12	CMP	36	2.5	55	Fair	24	Asphalt	SR 12	Cover
13	Twin CMP	36	2.5	48	Fair	24	Asphalt	SR 12	None
14	Twin CMP	84	3.0	45	Good	24	Asphalt	SR 12	None
15	CMP	36	9.0	75	Good	24	Asphalt	SR 12	None
16	CMP	48	11.0	104	Good	24	Asphalt	SR 12	None
17	CMP	60	8.0	60	Fair	16	Asphalt	Woodard	None
18	CMP	36	3.0	40	Fair	19	Asphalt	Woodard	None
19	CMP	120	4.5	70	Good	16	Asphalt	Sourwine	None
20	Concrete Box	8'x4'	0.5		Poor	18	Gravel	White	Cover/Condition
21	Concrete Box	4'x4'	0.3	21	Poor	16	Asphalt	Miller	Cover/Condition
22	CMP	72	1.5	55	Good	16	Asphalt	Hart	Cover
23	CMP	72	2.5	60	Good	16	Asphalt	Tubolino	None
24	Steel	42	1.5	36	Good	18	Asphalt	Miller	Cover
25	CMP	36	2.0	40	Fair	16	Asphalt	Wilder	None
26	Concrete Box	30"x30"	4.0	36	Poor	19	Asphalt	CR 12	Condition
27	Concrete	4'x4'	0.3	20	Poor	16	Asphalt	Ridge	Cover/Con

ID	Type	Size (inches)	Cover (feet)	Length (feet)	Culvert Condition	Road Width	Road Type	Road Name	Concern
	Box								dition
28	Bridge			32		22	Asphalt	SR 180	None
29	Bridge			16		30	Metal Deck	CR 12	None
30	Twin CMP	36	3.0	45	Poor	16	Asphalt	Dutch Gap	Condition

Source: Fisher Associates, 2010

3.7.2 Potential Impacts

3.7.2.1 Construction

Some temporary impacts to transportation in-route (mobilizing to the Project site), as well as in and around the Project site will result from the movement of vehicles involved in Project construction. These vehicles and their role in the Project are described below. The exact construction vehicles have not yet been determined, however, it is known that transportation of turbine components and associated construction material involves numerous conventional and specialized transportation vehicles, including:

- Gravel trucks for access road construction.
- Concrete trucks for construction of turbine foundations and transformer pads.
- Specialized flatbed trucks (with articulating rear axles to allow maneuverability) for transporting turbine and primary substation components (tower sections, blades, nacelles, and hubs).
- Cranes for assembly of the wind towers. Cranes are transported in sections over numerous trips to the site.
- Variety of conventional semi-trailers for delivery of reinforcing steel and small substation components and interconnection facility material.
- Pickup trucks for employees, equipment and tools.
- Oversize equipment escort vehicles.

Based upon an assessment of the existing conditions, CME developed probable construction travel routes as well as potential alternate routes for each site. CME identified route options to access the general Project site as well as options to access each turbine site. Figure 13 illustrates the preferred travel routes.

To access the general Project area, CME identified a potential route using access from Oswego to NY Route 12 as follows: Travel north on NY Route 3 from Oswego to the Baggs Corner intersection.

Turn left onto NY Route 180 and continue north until it intersects NY Route 12F. Turn right onto NY Route 12F and travel east toward the City of Watertown. Turn left at the I-81 Exit 46 Northbound Ramp and travel north until Exit 48. Get off I-81 at Exit 48 and bear to the right onto NY Route 342. Travel eastbound on NY Route 342 for approximately 0.15-miles and turn right into “turn around” lot on the south side of NY Route 342. Make a left turn onto NY Route 342 and travel westbound. Make a right turn onto NY Route 12 and continue northbound toward the wind farm.

Once on-site, construction and delivery vehicles are anticipated to concentrate operations on select public roadways, as well as new, private access roadways specifically constructed to access turbine locations and to carry construction and delivery related traffic. The preferred routes based on the preliminary routes identified by CME in 2007 FA in 2010 are presented in Table 24.

Table 24. Preferred Access from NY Route 12 to Wind Turbines

Wind Turbine Sites	Travel Route Description
1-6, 7, 8, 10, 11 and 17	North on NY Route 12, west on Lowe Road, north on CR 54 to the site.
12-16 and 18	North on NY Route 12 and west on Lowe Road to the site.
19-22	North on NY Route 12, west on Lowe Road, south on Sternberg Road to the site.
48 and 41	North on NY Route 12, west on Lowe Road, south on CR 54 and east on Morris Tract Road to the site.
24-25, 35-36	North on NY Route 12, east on Hart Road to the site.
28-29	North on NY Route 12 to the site.
30-33	North on NY Route 12, east on Woodard Road to the site.
9 and 45	North on NY Route 12, northeast on Miller Road, and west on Hart Road to the site.
38-40, 49-50	North on NY Route 12, northeast on Miller Road, and east on Tubolino Road to the site.
47, 52-53	North on NY Route 12, northeast on Miller Road (continue as Miller Road becomes Wilder Road), north on Wilder Road to the site.
46, 54-55	North on NY Route 12, northeast on Miller Road (continue as Miller Road becomes Wilder Road), and north on Wilder Road and west on County Route 12 to the site.

Table 25 represents an estimate of the total number of loaded truck trips entering the site during the construction of the turbines. The estimates do not account for trips associated with the construction of Project access roads.

Table 25. Preliminary Trip Generation Estimate (loaded trucks entering)

Component/Truck Type	Assumption	Trips
Blades	One blade per truck	150
Towers	4 sections per tower	200
Nacelle	One nacelle per truck	50
Hub, Nose Cone, and other components	7 truck trips per tower	350
Road Construction	Gravel trucks 10 cubic yards per truck, plus other construction equipment.	Unknown
Crane	Several trips per access point depending on the degree of disassembly.	Unknown
Concrete	250 to 450 cubic yards per foundation, 8 cubic yards per truck. Assume 50 trips per tower.	2,500
Total Heavy Vehicle Trips		3250

Note: trips should be doubled to account for exiting.

Oversize construction vehicles could cause minor delays on Project area roadways, but these are unlikely to be significant given the relatively low traffic volume through the area. Each of the routes identified in Table 25 have a number of constraining features including turning radii. Improvement options for turning radii constraints include widening on the inside or the outside of the curve. The delivery and construction of the turbines may also require general roadway widening. It is assumed that a minimum 16-foot roadway and shoulder width will be necessary to accommodate construction of the Project.

The following construction activities will likely be required at the locations of road width and turning radii improvements:

- Clearing and grubbing of existing vegetation
- Grading of the terrain to accommodate the improvement
- Extension of existing drainage pipes and/or culverts
- Re-establishment of ditch line (if necessary)
- Construction of a suitable roadway surface to carry the construction traffic (based on the existing geotechnical conditions)

Improvements to public roads will be included among the initial stages of Project construction, and are anticipated to start in the spring of 2013.

The required improvements will be coordinated with state, county, and local highway departments (at no expense to these departments) prior to the arrival of oversize/overweight vehicles on-site. In

addition, these improvements may create additional Project related impacts (i.e. wetlands, drainage, grading, etc.) that will be addressed in detail during the final Project design, and reviewed/approved during all Project permitting subsequent to this DEIS (i.e., SPDES General Permit, USACOE/NYSDEC wetland permits, highway work permits).

Twelve of the thirty drainage structures (pipes/culverts) surveyed by FA were determined to have less than two feet of cover or are in poor condition. Eight of these twelve structures are within the proposed transportation route. As a result these structures are susceptible to damage thus causing traffic disturbance and delay to local motorists, construction delay, and potential damage to construction vehicles and/or project components.

3.7.2.2 Operation

Once the Project is commissioned and construction activities are officially concluded, permanent impacts will likely be concentrated around the O&M facility. The Project will employ up to approximately eight to eleven individuals, all of who may drive separately to the O&M building. Some of these personnel will need to visit each turbine location and return to the O&M building. Each turbine typically requires routine maintenance visits once every three months, but certain turbines or other Project improvements may require periods of more frequent service visits should a problem arise. Such service visits typically involve one to two pick-up trucks.

Project personnel (or NYSEG personnel) may also need to service the Project substation. Routine servicing would likely be carried out on a similar quarterly basis (unless a non-routine maintenance matter occurs) and would involve a similar number of maintenance vehicles. In addition to maintenance activity, the operation of a wind power project typically increases tourist traffic, which can negatively impact certain roadways within the Project site.

The Project owner is responsible for the maintenance of all private access roads leading to the turbine sites, and does not anticipate plowing access roads during winter months. Therefore, it may become necessary for personnel to service turbines with snowmobiles or some other small track driven vehicles.

3.7.3 *Proposed Mitigation*

Special hauling permits are required when loads exceed legal dimensions or weights. Thus transport of the blades, nacelles, tower sections and crane will require a variety of special hauling permits. The types of permits depend on the characteristics of the vehicle and its cargo, number of trips,

distance traveled and duration. The following list summarizes the driveway permits and special hauling permits that may be required as reported in the CME study:

Roadway Improvement/Driveway Permits

- NYSDOT – A Highway Work Permit (PERM 33) for any physical improvement within the NYSDOT right-of-way. This will apply to improvements on NY Route 12 at the proposed tower site access road locations and any state highway intersection or road improvements.
- Jefferson County – A work permit will be required for any improvements on County roads. A roadway use agreement will be drafted that will require the Project sponsor to restore any County road back to existing conditions or better after the completion of the project.
- Town of Clayton – Based on meetings with the Highway Superintendent, no permits are required. A roadway use agreement will be drafted that will require the Project sponsor to restore any Town road back to existing conditions or better after the completion of the project.

Overload Permits

- NYSDOT – NYSDOT permit package outlines the guidelines, types, and fees for various special hauling permits. Based on this outline and a discussion with NYSDOT special hauling permit representatives, it is expected that the Project will require the Type 13 Jobsite permit to cover most of the special hauling trips (not including super loads). Type 13 permits are issued at 6-month intervals and can be extended for up to a maximum of one year. Several Type 1 permits for individual convoys may also be required including special hauling, route approval, trailer attachment, vehicle configuration, and cranes (PERM 85, PERM 12, PERM 80, PERM 39-1, PERM 39-2k, PERM 39-3g, PERM 99, AND PERM 39-4).
- Jefferson County – A Divisible Load Permit will be required for this Project (see Appendix B of Appendix O).

Prior to construction, the applicant and/or contractor will obtain all necessary permits described above.

Final transportation routing will be designed to avoid/minimize safety issues associated with the use of the approved haul routes, which will confine the heavy truck travel to a few select roads. The Applicant will repair damage done to roads affected by construction within the approved haul route, at no expense to the Towns, County, or State. CME conducted a pre-construction photo log to inventory the current roadway conditions (Appendix C of Appendix O). Upon completion of the

construction activities, Atlantic Wind, LLC will, at a minimum, return all roadways to their pre-construction conditions. The Applicant is committed to working with the Town, County, and State agencies to confirm necessary transportation improvements before and after completion of the Project, and that such improvements will be stipulated in the Project approval. This could include:

- Additional route and condition surveys.
- Bonding of improvements.
- Temporary removal of obstacles and replacement in kind.
- Completion of any necessary roadway improvements prior to Project construction.
- Restoration after the Project.

Delivery/haul routes may change during the design and construction preparation process; however, the municipalities will be notified of the changes throughout the continued development of the Project. Additionally, design plans will be completed for all public road improvements, and will be made available for the affected local towns (and to the owner/operator of the respective road) to review prior to construction activities.

The following outlines the proposed protocol for responding to traffic/transportation issues that arise during Project construction:

- Prior to construction Atlantic Wind, LLC will identify one or more construction managers as the primary traffic contact(s) for traffic/transportation concerns that may arise during the construction of the Project.
- The town, county, and state highway departments will be notified of the primary traffic contact(s).
- Atlantic Wind, LLC will consult with all town, county, and state highway departments prior to construction to identify potential traffic congestion areas and to develop potential detours.
- If construction-related congestion occurs, the primary traffic contact will call the appropriate town, county, or state highway department immediately and discuss the implementation of pre-determined detour routes.
- All construction personnel will be instructed to watch for traffic/transportation concerns and to contact the primary traffic contact immediately following identification of a traffic/transportation issue.
- The primary traffic contact will call the appropriate town, county, or state highway department immediately following identification of a congestion problem.

3.8 SOCIOECONOMICS

To understand the effects this Project will have on socioeconomic conditions within the Town of Clayton and the surrounding communities, it is important to understand the current state of the economy in the area. Thus, this section presents specific information regarding the labor force, including population and housing; the economy, in particular employment rates and opportunities; and municipal budgets and taxes, including the local school budgets and taxes. The potential impacts of the Horse Creek Wind Farm on these existing socioeconomic conditions, during both construction and operation, are then evaluated.

3.8.1 Existing Conditions

Existing population and housing, employment and income, and municipal budget and taxes in the Town of Clayton is described below.

3.8.1.1 Population and Housing Characteristics

From 1990 to 2009 the census data reveals that Jefferson County and the Town of Clayton have experienced a continuous increase in population (see Table 26). According to U.S. Census Bureau data from 1990-2009, Jefferson County and the Town of Clayton experienced modest overall population growth at 7.0%, and 11.4% respectively. The 2009 estimated population for Jefferson County is 118,719, and 5,158 for the Town of Clayton.

Table 26. Population Trends in the Project Area

	2009 Estimated Population	Estimated Change 2000-2009	2000 Population	Estimated Change 1990-2000	1990 Population
Jefferson County	118,719	6.2%	111,738	0.7%	110,943
Town of Clayton	5,158	7.1%	4,817	4.1%	4,629

Source: U.S. Census Bureau, 2009

A significant portion of available housing in Clayton is only utilized for seasonal, recreational or occasional uses. According to the 2005-2009 American Community Survey 5-year Estimates, the number of total available housing units in the Town of Clayton was 3,293, of which 64.5% (or 2,124) were occupied and 35.5% (or 1,169) were vacant (U.S. Census Bureau, 2009). However, the majority of the vacant houses are for seasonal, recreational or occasional use. As the town and county have experienced very little increase in population over the past few years it can be rationally assumed that the availability of housing remains strong.

Not only is housing available but local home ownership is fairly strong. Based on 2005-2009 American Community Survey 5-year Estimates, home ownership is 70.9% in the Town of Clayton. Home ownership in Jefferson County is less strong, at approximately 60.1% (U.S. Census Bureau, 2009). The percentage of ownership reflects the affordability of housing in the area.

Based on 2005-2009 American Community Survey 5-year Estimates, the median housing values in the Town of Clayton are comparable to the median value for Jefferson County, but are low when compared to the median value for New York State. The median housing value in the Town of Clayton was \$119,000, whereas the County median value was \$108,900. This compares to a statewide median value of \$300,600.

3.8.1.2 Economy and Employment

According to the 2000 Census, the largest industry in Jefferson County was the educational, health, and social services industry, with approximately 23.2% of workers employed in this sector. The second largest industry was retail trade (15.0%), and the third was arts, entertainment, and recreation, and accommodation and food services (10.8%). Jefferson County is home to Fort Drum, and 7.5% of the County labor force is in the Armed Forces. Jefferson County is also a regional administrative center for New York State government programs, and home to two correctional facilities. Other top employers in Jefferson County include Samaritan Health System, Jefferson County Government, Stream International, Jefferson-Lewis BOCES, and Jefferson Rehabilitation Center. The Jefferson County unemployment rate in December 2010 was 10.4% (not seasonally adjusted). In comparison, the unemployment rate for New York State in December 2010 was 8.0% (NYS Department of Labor, 2010)

With respect to the agricultural industry within the county, in 2007 there were a total of 885 farms (262,331 acres). This represents a 63% decrease in farms since 1959, when the county had 2,390 working farms (515,905 acres), accounting for a significant percentage of the total employment in the county (USDA National Agricultural Statistics Service, 2007). Unfortunately, the decline in employment in the agricultural industry is a continuing trend. In 2009, there were 148 parcels in agricultural use in the Town of Clayton (assessed value of \$20,150,900) (NYS Office of Real Property Services, 2010).

3.8.1.3 Municipal Budgets and Taxes

Municipalities (towns, villages, and counties) and school districts are responsible for providing specific services and facilities to those who live and work within their boundaries. Municipalities and

school districts incur costs associated with providing these facilities and services, and to cover these costs, collect revenues by levying taxes. Tax revenues in the Project area accrue from both sales taxes and real property taxes. The taxing jurisdictions in the Project site include Jefferson County, the Town of Clayton, and the LaFargeville and Thousand Islands Central School Districts. Table 27 summarizes the total 2009 property tax levy for these taxing jurisdictions.

Table 27. 2009 Real Property Tax Levy Per Taxing Jurisdiction.

Taxing Jurisdiction	2009 Real Property Tax Levy
Town of Clayton	\$827,107
Jefferson County	\$44,417,886
LaFargeville Central School District	\$2,709,788
Thousand Islands Central School District	\$8,335,541

Source: NYS Office of State Comptroller, 2010

The distribution of broad land use categories within the towns is similar to that seen throughout Jefferson County. In 2009 the highest percentage of land use in both the towns and the county was classified as residential. The second highest percentage of land use was vacant land with agricultural land ranking third (NYS Office of Real Property Services, 2010). Type of land use contributes to the assessed value of property, and thus influences the total real property tax levy for the towns and county. The total assessed value of the land use classifications for each town is summarized in Table 28 below.

Table 28. Assessed Value of Property in the Town by Land Use Classification, 2009.

Type of Land Use	Town of Clayton	
	Total Assessed Value	Percent of Total Parcels
Residential	\$546,330,810	63.6%
Commercial	\$56,800,900	4.0%
Industrial	\$1,391,900	0.4%
Recreation & Entertainment	\$19,876,400	0.7%
Community Service	\$23,054,200	1.2%
Agricultural	\$20,150,900	3.7%
Vacant Land	\$56,733,835	24.8%
Public Service	\$16,511,314	1.0%
Public Parks, Wild, Forested & Conservation	\$2,639,300	0.6%
Total	743,489,559	100%

Source: NYS Office of Real Property Services, 2010

Another source of revenue is the local sales tax revenue. The current sales tax rate for the County is 7.75% (3.75% local tax plus 4% state tax) (NYS Department of Taxation and Finance, 2010). In 2009, the total sales tax revenue for the county was \$60,755,262. The Town of Clayton collected \$1,333,752 in sales tax revenue (NYS Office of the State Comptroller, 2010).

The county, town, and school district budgets are influenced by several factors, one of which is the annual real property tax levy. An increase in revenues raised through real property taxes has a positive effect on local municipal budgets. However, local business owners, farmers, or residents are directly impacted when their real property tax or sales tax obligations increase. Table 29 summarizes municipal budgets for 2009 at the town and county levels. Table 30 summarizes the 2009 budgets for the LaFargeville and Thousand Islands Central School Districts.

Table 29. 2009 Municipal Budgets (County and Towns).

Taxing Jurisdiction	Total Revenue	Total Expenditures	Indebtedness
Town of Clayton	\$3,713,001	\$4,211,141	\$2,169,750
Jefferson County	\$190,615,672	\$185,235,644	\$23,003,627

Source: NYS Office of the State Comptroller, 2010

Table 30. 2009 School District Budgets.

District	Revenue (total)	Expenditure (total)	Indebtedness
LaFargeville CSD	\$9,297,845	\$8,963,223	\$3,305,000
Thousand Islands CSD	\$19,758,497	\$26,125,594	\$15,852,064

Source: NYS Office of the State Comptroller, 2010

The town, county, and local school districts face the yearly challenge of meeting their service obligations or expenditures through the collection of sales and real property taxes. Property tax is the largest single source of revenue that offsets the cost of providing local services. As with most taxing jurisdictions in upstate New York, the loss of (or lack of) commercial and industrial tax base, in combination with rising service and material costs, make it increasingly difficult to meet their budgets without significantly raising real property taxes.

3.8.2 Potential Impacts

The Project will have both direct and indirect positive economic effects on the towns, county, and school districts, as well as the individual landowners participating in the Project. These effects will commence during construction and continue throughout the operating life of the Project. In the short term, benefits will include additional employment and expenditures associated with Project construction. In the long term, the Project will generate significant additional revenue through a

PILOT agreement with local tax jurisdictions, purchases of goods and services, and lease payments to participating landowners. The Project will also provide full-time employment for a limited number of individuals and likely result in some increased visitation to the Project area by tourists interested in the wind power facility. All of these results could have a beneficial effect on local businesses. The overall socioeconomic impact of Project construction and operation is discussed in detail below.

3.8.2.1 Construction

3.8.2.1.1 *Population and Housing*

As mentioned previously, the towns located within the Project site experienced a modest growth rate from 1990 to 2009. This population trend will likely continue regardless of whether the proposed Project is built. The Project will not generate construction employment at a level that would significantly increase population in either the towns or county. Even though employment during the construction period will be significant (on the order of 100 to 150 full-time jobs), this employment is relatively short term, and is not expected to result in workers permanently relocating to the area. For the expected nine-month construction period, there could be a temporary increase in local population and demand for temporary housing by out-of-town workers. However, this demand will be relatively modest, and can easily be accommodated by the available housing in towns and surrounding communities. Beyond this relatively minor (and positive) short-term impact, Project construction will have no significant impact on population and housing.

3.8.2.1.2 *Economy and Employment*

It is anticipated that construction of the proposed Project will employ a total work force of up to 150 employees, and that the majority of this employment will be drawn from the Thousand Islands labor market. Local employment will 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 the majority of these specialized workers will originate from outside the area and will remain only for the duration of construction.

In addition to the jobs created during construction and the wages paid to the work force, this Project will have a direct economic effect (or impact) from the first round of buying/selling, which includes the purchase of goods from local sources (such as fuel), the spending of income earned by workers, annual labor revenues, and the income effect of taxes. These direct effects will result in additional, subsequent rounds of buying and selling in other sectors. Thus, the Project will have an indirect

effect (or impact) through the increase in sales of other industry sectors in the county (NWCC, 2004).

3.8.2.1.3 Municipal Budgets and Taxes

During construction, the Project will not impact municipal budgets and taxes. Temporary construction workers will not create significant demand for municipal or school district services or facilities. These workers will also not generate significant revenue through payment of property taxes. However, sales tax revenue will increase through the purchase of local goods and services. The Project will result in impacts to the local road system (see discussion of transportation impacts in Section 3.8.2). This has the potential to affect local highway department expenditures/budgets. However, as will be discussed in the mitigation section, cost of any construction-related road repairs/improvements will be borne by the Project developer.

3.8.2.2 Operation

3.8.2.2.1 Population and Housing

Approximately eight to eleven full-time jobs will be created once the Project is fully operational. These will include wind technicians, a project manager, and administrative support people. These employees are expected to reside locally, which could translate into purchase of a few homes and addition of a few families to the towns and/or the surrounding communities. Although this represents a positive economic impact, long-term employment associated with the Project is not large enough to have a significant impact on local population or housing characteristics.

Factors beyond property values have an effect on population and housing. For example, the upgrade of some local roads could conceivably promote access to areas that were previously undeveloped. With some minor exceptions, much of the public road system within the Project area consists of improved, year round roads. Therefore, the improvement of existing road systems to accommodate Project component delivery (e.g. turning radii, culvert replacement, etc.) is not anticipated to substantially promote additional residential or commercial growth (area is not currently zoned commercial) within the Project area than currently exists. Project access roads that will be constructed will be located within private easements, and therefore will not induce growth in the area. Other factors having an effect on population and housing could result from an aversion to living near wind energy facilities. It may be reasonable to assume that some area residents could relocate due to an objection to the presence of a wind turbine, dependent upon individual personal acceptance. No published studies could be found that document a reduction in occupied houses in a given area after the construction of a wind turbine project.

Local residents often express concern over the potential for local property values to depreciate as a result of a proposed wind power project. This issue has come up during the siting and review of other wind power projects in New York and throughout the United States. In order to address this concern, the Renewable Energy Policy Project (REPP) conducted a quantitative study in 2003 (REPP, 2003). REPP assembled a database of real estate transactions adjacent to every wind power project in the United States (10 MW or greater) that became operational between 1998 and 2001 (a total of 10 projects, including the Madison and Fenner projects in Madison County, New York). For this study, data was gathered within 5 miles of the wind projects, as this was determined to be the potential area of visual impact (viewshed). For each of the 10 projects, similar data was also gathered for a comparable community that was located outside of the project viewshed (comparable communities were based on interviews with local assessors as well as analysis of U.S. Census demographic data). The goal of the data collection was to obtain real estate transaction records for a time period covering roughly 6 years (3 years pre-construction and 3 years post-construction). The data was then analyzed in three different ways: Case 1 examined the price changes in the viewshed and the comparable community for the entire period of the study; Case 2 examined how property values changed in the viewshed before and after the project became operational; and Case 3 examined how property values changed in the viewshed and the comparable community after the project became operational.

The results of these analyses showed no negative affect on property value from existing wind farms. Of the 10 projects examined in the Case 1 analysis, property value actually increased faster within the wind power project viewshed in eight of the ten projects. The Case 2 analysis revealed that the property values also increased faster after the wind farms became operational in nine of the ten projects examined. In the Case 3 analysis, property values increased faster in the wind power project viewshed than in the comparable community in nine of the ten projects. More specifically (and perhaps more relevant to the proposed Horse Creek Wind Farm) is the fact that these positive results apply to the Madison Wind Power Project and the Fenner Wind Power Project in New York State. The results from the Madison and Fenner analysis revealed a generally positive affect on property value. In five of the six case studies (Case 1, 2, and 3 analyses for both projects), the monthly average sales price grew faster or declined slower in the viewshed communities than in the comparable communities outside the project viewshed. The REPP study therefore concluded that there is no evidence that the presence of the Madison and Fenner wind farms had a significant negative effect on residential property values in Madison County, New York (REPP, 2003).

However, it should be noted that the REPP study has been criticized because it assumes that all properties within the study area have a view of the respective wind farm, does not account for property distance to the wind farm, uses not ideal statistical analysis, and includes inappropriate transactions (e.g., estate sales, sales between family members, sales due to divorce, etc.). To present a clearer understanding of the actual effects of existing wind farms on property values, a master of science thesis was prepared by Ben Hoen (2006). The purpose of this study was to analyze if the transaction value of homes within 5 miles of the existing Fenner Wind Farm was significantly affected by views of the wind farm. "View" is defined using a continuous variable from 0 (no view) to 60 (a full view of all 20 turbines). The study additionally investigates how this effect varies with distance (spatially), time (temporally) and house value. Lastly, the effect and degree of the PILOT payment to Fenner Township is investigated. The study utilized the hedonic pricing model, which, given enough data, is sensitive enough to allow sales to be grouped temporarily (e.g., by year), spatially (e.g., by distance), and economically (by the value of the home).

The data concerning transaction values and assessor information was collected from the Madison County Real Property Tax Office. From January 1, 1996 through June 1, 2005, 452 sales took place that were coded "arms-length" transactions by county assessors, and were within 5 miles of Fenner Wind Farm. Of these 167 were removed as land-only sales (i.e., sale of parcel that did not contain a house), and five were removed as non arms-length sales, resulting in a total of 280 sales. Of these, 140 occurred after construction of the Fenner Wind Farm began (2001). A field analysis was conducted on October 30 and 31, 2005 to ensure complete accuracy of the "view" variables used in the model. Visits were made to those homes sold after January 1, 2001 (138 homes visited) to assess the degree to which the home could see the wind farm. By standing at or near the house a rating of 1 to 60 was established for each home. This rating was based on the degree to which viewers could see each of the 20 windmills in the Fenner Wind Farm. A total of 3 points per turbine were possible (one point if only the blade above the nacelle was visible, two points if the nacelle was also visible, and three points if the tower below the rotor swept area was also visible), for a cumulative maximum of 60 points.

The analysis of 280 home sales within 5 miles of the Fenner Wind Farm did not reveal a statistically significant relationship between either proximity to or visibility of the wind farm and the sale price of homes. Additionally, the analysis failed to uncover a relationship even when concentrating on homes within one mile of the wind farm that sold immediately following the announcement and construction of the project. This study therefore concluded that in Fenner, a view of the wind farm does not produce either a universal or localized effect, adverse or not. To the degree that other

communities resemble the Fenner rural farming community, similar conclusions are anticipated (Hoen, 2006).

Also worth noting is a June 28, 2005 press release from the Madison County Public Information and Services Department. This press release discussed a recent study published in *Progressive Farmer* (a national publication), which ranked Madison County as the fourth best place to live in the northeast in their list of Best Places to Live in Rural America. The rankings for each county were based upon healthcare, education, climate, pollution, crime, and tax burden (Madison County, 2005).

A more recent study sponsored by the United States Government focused specifically on impacts of wind farm projects on residential property values. The report *The Impact of Wind Power Projects on Residential Property Values in the United States: A Multi-Site Hedonic Analysis*, released in December 2009 explains the study and the conclusions drawn from the study (Hoen *et al.*, 2009). A more broad approach to assessing potential impacts on property values of residences near wind farm 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. 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. An explanation of each identified stigma, as used in this study is: Area stigma may occur regardless of whether the wind facility is within view of the home. The mere fact that a wind farm 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 farm 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).

Given the results of the REPP (2003) and Hoen studies (Hoen, 2006; Hoen *et al.*, 2009), and the similarity of the Madison County sites to the Horse Creek Wind Power Project area, it is reasonable to conclude that the proposed Project will not have an adverse impact on local property value.

3.8.2.2.2 *Economy and Employment*

Total wages and benefits for these Project's eight to eleven full-time employees are estimated to be approximately \$750,000-\$950,000 per year. It is anticipated that these jobs will have a spin-off effect on the local economy, through local expenditures on goods and services associated with Project operation and maintenance. Expected lease payments will range between approximately \$8,000-\$12,000 per wind turbine (totaling approximately \$400,000-600,000 per year), will be provided to local landowners participating in the Project. Also, one-time access easement and construction payments will be approximately \$500,000 paid at commencement of construction. These lease payments are a direct financial benefit to all participating landowners and will enhance the ability of those in the agricultural industry to continue farming. Russell Cary, Supervisor of the Town of Fenner, New York believes that lease payments from the wind power project in his town are preserving a rural life style and protecting family farms from being taken over by large-scale commercial farming operations (R. Cary, pers. comm.). Local lease payments will also enhance the ability of participating landowners to purchase additional goods and services. To the extent that these purchases are made locally, they will have a broader positive effect on the local economy.

With respect to tourism in the region, it is worth noting that other wind power projects in New York have resulted in a significant increase in visitation from tourists interested in the projects. This has certainly resulted in increased local expenditures for goods and services, but these have not been quantified, and are probably fairly modest. It should also be acknowledged that this effect is likely to diminish as wind power projects become more common in the state and their novelty decreases.

Despite potential concerns, there is no evidence to indicate that the presence of wind turbines will have a negative impact on tourism. A 2002 study conducted in the Argyll Region of Scotland, involving interviews with over 300 tourists, found that 91% said the presence of wind farms in the area would not influence their decision about whether to return to the area (MORI Scotland, 2002). Almost half (48%) of the tourists interviewed were visiting the area because of the 'beautiful scenery and views'. Of those who had actually seen wind farms, 55% indicated that their effect was "generally or completely positive", 32% were ambivalent, and 8% felt that the wind farms had a negative effect. Similar positive effects have been reported from various wind farm locations in Australia. According to the Australian Wind Energy Association (AusWEA), initial concerns that wind

turbines would negatively impact tourism in that country have proven unfounded (AusWEA, 2003). Similarly, a recent survey of visitors to Vermont's Northeast Kingdom found that 95% would not be deterred from further visits by the existence of a proposed wind farm (Institute for Integrated Rural Tourism, 2003). This is also evident in the resort community of Palm Springs, California, where there are over 3,500 wind turbines. Tours of this wind farm regularly draw 10,000 to 12,000 curious tourists every year according to Christy Regaldo of PS Windmill Tours (Clean Power Now, 2006).

3.8.2.2.3 *Municipal Budgets and Taxes*

According to New York State Real Property Tax Law, Article 4, Section 487, real property, which includes a wind energy system, shall be exempt from local real property taxation. However, since local municipalities and school districts both have the option to disallow this tax-exempt status for properties that lie within their jurisdiction (See RPTL §487[8]), as a practical matter these local taxing authorities generally require that the sponsor of a wind project enter into a PILOT agreement as a condition for not “opting out” of the section 487 exemption. The sponsors of the Horse Creek Wind Farm expect to enter into a PILOT agreement with the Town of Clayton, and other local tax jurisdictions.

The section 487 exemption only applies to the wind project facilities; turbines, towers and the “balance of plant” (collection system, access roads and utility interconnection), and does not affect the tax status of the underlying property. Atlantic Wind will endeavor to have the wind turbines treated as “suffix” parcels, for local real property tax purposes, however this treatment needs to be approved by local tax authorities. A “suffix parcel” is an arrangement that has been used for cell towers and billboards in which a unique tax ID is created for each WTG tower, but without any legal attachment to the underlying tax parcel so the suffix parcel is associated with the coordinates of the tower, but not the underlying tax parcel on which it is located. The taxes due on a suffix parcel are solely the responsibility of the project company, without any recourse to the “underlying” landowner.

Studies of the impact on property values of wind projects in NYS (and elsewhere) indicate that these projects typically do not have an adverse effect on the assessed value of other properties in the vicinity of the wind project (REPP, 2003; Hoen, 2006; Hoen *et al.*, 2009). Thus Clayton should not expect to see any diminution of local tax receipts related to this wind Project, and in fact should see these tax revenues increase as a result of the PILOT agreement. The Project should not negatively affect the total amount of real property taxes levied by the local taxing jurisdictions or the budgets of these jurisdictions.

According to the Town of Fenner Supervisor Russell Cary, the wind farm in his town has required the town to purchase additional road maintenance equipment to service roads that have been improved or are more heavily traveled as a result of the project (R. Cary, pers. comm.). However, the improved roads are a benefit to the community, and represent the only significant municipal service required by the Project, which makes an annual PILOT payment to the town. The Horse Creek Wind Farm will place similar, limited demand on municipal services, and probably no new impacts on the local school districts.

The Project will have a beneficial impact on municipal budgets and taxes in that the taxing jurisdictions will receive additional revenue from the Project in the form of PILOT payments. (The total amount of these payments in lieu of tax, as well the local sharing arrangement of these payments among the several local tax jurisdictions, is yet to be determined.) Through the PILOT agreement, the Project will more than offset any limited impact on municipal budgets by generating additional revenue. The details of the PILOT agreement are described in Section 3.9.3.2.3 below.

3.8.3 Mitigation

3.8.3.1 Construction

As described in the Impacts discussion, construction of the proposed Project will not have a significant impact on local population and housing, and will have a short-term beneficial impact on the local economy and employment. Consequently, no mitigation is necessary to address these impacts. The Project sponsors anticipate that a road use agreement will be put in place with the host communities, and Jefferson County. This agreement will specify both a) the local and county roads that can be used by the Project company and its contractors for the hauling of the heavy loads required to construct the wind Project, and b) the extent to which these roads will be replaced and/or repaired by the Project company.

3.8.3.2 Operation

3.8.3.2.1 *Population and Housing*

As discussed in Section 3.9.2.1, the operating Project is not anticipated to adversely affect population or housing availability in the towns or the surrounding area. Nor is it expected to have a depressing effect on local property values. Consequently, mitigation measures to address population and housing impacts are not necessary.

Property owners within the viewshed of proposed wind power projects are often concerned about the possibility that these projects could at some point be abandoned, and that the derelict facilities will have a depressing effect on local property values. To address this concern, the Project developer will establish a decommissioning fund. This fund will assure that the proposed wind power facility will be dismantled and removed at the end of its useful life--or in the event that it is abandoned before completion or later proves economically unviable. Prior to the start of construction the Project developer will submit evidence of the mechanisms that are in place to satisfy this decommissioning requirement.

3.8.3.2.2 Economy and Employment

As described previously, the operating Project's potential impact on the local economy and employment will be positive, in that additional jobs will be created and additional local expenditures made (lease payments to participating landowners, as well as local purchase of goods and services). However, the number of permanent jobs created is not large enough to create a financial burden on the towns, county, or school districts by requiring provision of additional services and/or facilities. Thus, mitigation measures to address either loss of jobs or increased demand for municipal services are not necessary.

3.8.3.2.3 Municipal Budgets and Taxes

Operation of the proposed Project will not create a significant demand for additional municipal or school district services and facilities, and therefore it will have no adverse impact on municipal or school budgets. Atlantic Wind plans to enter into a PILOT agreement with local tax jurisdictions that will likely have a 20-year term. Although the specific terms of the PILOT agreement have not been negotiated, Atlantic Wind anticipates that the annual PILOT payment will be approximately \$8,000 per MW of installed generation capacity, escalating with inflation. At that rate, and assuming that 96 MW of generation is installed, the PILOT payments would average approximately \$768,000 per year for a minimum of \$15 million over the life of the contract. Atlantic Wind anticipates that the annual PILOT payments would be shared amongst the Town of Clayton, Jefferson County, and the local school districts, in accordance with the terms of the PILOT agreement. After expiration of the PILOT the facility will be taxed at the value determined by the local assessor.

The PILOT payments will increase the revenues of the local taxing jurisdictions, and will represent a significant portion of their total tax levy. Further, the PILOT payments will 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., small number of additional school children, slightly increased road maintenance costs).

Because the wind farm facility will generate a predictable source of additional revenue for all of the affected municipalities and school districts over the next 20-plus years, the Project will positively impact municipal and school district revenues. This will enhance the type and level of services these jurisdictions provide to local residents for the duration of the Project's operational life.

3.9 PUBLIC SAFETY

This section addresses concerns regarding public safety at the proposed Project site. Background information on public health and safety issues associated with wind energy projects is presented first, followed by a discussion of potential impacts associated with the Project, and proposed mitigation measures.

3.9.1 Background Information

Public safety concerns associated with the construction of a wind power project are fairly standard construction-related concerns. These include the potential for injuries to workers and the general public from 1) the movement of construction vehicles, equipment and materials, 2) falling overhead objects, 3) falls into open excavations, and 4) electrocution. These types of incidents are well understood, and do not require extensive background information. With proper safety precautions, such construction-related injuries can be prevented.

Public safety concerns associated with the operation of a wind power project are somewhat more unique, and are the focus of this section. In many ways, wind energy facilities are safer than other forms of energy production since a combustible fuel source and fuel storage are not required. In addition, use and/or generation of toxic or hazardous materials are minor when compared to other types of generating facilities. However, wind turbines are generally more accessible to the public, and risks to public health and safety can be associated with these facilities. Examples of such safety concerns include ice shedding, tower collapse/blade throw, stray voltage, fire, lightning strikes, electrocution, and electro-magnetic fields. In addition, there has been much debate over the alleged negative health effects caused by low frequency sound produced by operating wind turbines. Each of these concerns is discussed individually below.

3.9.1.1 Ice Shedding

Ice shedding and ice throw refer to the phenomena that can occur when ice accumulates on rotor blades and subsequently breaks free and falls to the ground. Although a potential safety concern, there has been no reported human injury caused by ice being "thrown" from an operating wind turbine (Global Energy Concepts, 2005). However, ice shedding does occur, and could represent a potential safety concern.

Under certain weather conditions, ice may build up on the rotor blades and/or sensors, changing the aerodynamics of the blades, slowing the rotational speed, and potentially creating an imbalance in the weights of the individual blades. Such effects of ice accumulation can be sensed by the turbine's computer controls and would typically result in the turbine being shut down until the ice melts. Field observations and studies of ice shedding indicate that most ice shedding occurs as air temperatures rise and the ice on the rotor blades begins to thaw. Therefore, the tendency is for ice fragments to drop off the rotors and land near the base of the turbine (Morgan *et al.*, 1998). Ice can potentially be "thrown" when ice begins to melt and stationary turbine blades begin to rotate again (although turbines usually do not restart until the ice has largely melted and fallen straight down near the base).

The distance traveled by a piece of ice depends on a number of factors, including: the position of the blade when the ice breaks off, the location of the ice on the blade when it breaks off, the rotational speed of the blade, the shape of the ice that is shed (e.g., spherical, flat, smooth), the surrounding terrain (e.g. nearby elevation changes), and the prevailing wind speed. Data gathered at existing wind farms have documented ice fragments on the ground at a distance of 50 to 328 feet from the base of the tower. These fragments were in the range of 0.2 to 2.2 pounds in mass (Morgan *et al.*, 1998). Ice throw observations are also available from a wind turbine near Kincardine, Ontario, where the operator conducted 1,000 inspections between December 1995 and March 2001. Only 13 of the 1,000 inspections noted ice fragments, which were documented on the ground at a distance up to 328 feet (100 meters) from the base of the turbine, with most found within 164 feet (50 meters) (Garrad Hassan, 2007).

3.9.1.2 Tower Collapse/Blade Throw

Another potential public safety concern is the possibility of a wind turbine tower collapsing or a rotor blade dropping or being thrown from the nacelle. While extremely rare, such incidents do occur. For example, a tower collapsed at the Klondike III Wind Farm in Oregon in August 2007, resulting in the death of one worker and injury to another. In addition, a wind turbine collapse occurred at the Altona

Windpark in Clinton County, New York in March 2009. The incident occurred during unintended loss of electric power, during which two turbines failed to switch into safe mode (i.e. shut down) as designed, due to incorrect wiring (Cartledge, 2010). As a result, the rotors of these two turbines spun freely at three times their designed speed, causing the collapse of one turbine and damage to the other (Cartledge, 2010). According to Noble, the turbine collapse caused a small fire and scattered debris up to 345 feet from the base of the turbine (The Press Republican, 2009). No one was injured as a result of the incident and local setbacks proved sufficient to protect area homes and public roads. In December of 2009, a turbine collapsed at the Fenner Windpower Project in Madison County, New York.

Such incidents can be dangerous for project personnel, and potentially for the general public, as well. The reasons for a turbine collapse or blade throw vary depending on conditions and tower type. Past occurrences of these incidents have generally been the result of design defects during manufacturing, poor maintenance, wind gusts that exceed the maximum design load of the engineered turbine structure, or lightning strikes (AWEA, 2008a). Most instances of blade throw and turbine collapse were reported during the early years of the wind industry. Technological improvements and mandatory safety standards during turbine design, manufacturing, and installation have largely eliminated such occurrences.

3.9.1.3 Stray Voltage

Stray voltage is a phenomenon that has been studied and debated since at least the 1960's. It is an effect that is primarily a concern of farmers whose livestock can receive electrical shocks. Stray voltage can be defined as a "low level of neutral-to-earth electrical current that occurs between two points on a grounded electrical system" (Schmidt, 2000). The term stray voltage can be further defined as a "continuous voltage sources of less than 10 volts between two objects that are likely to be contacted simultaneously by livestock". Most stray voltage problems have been traced to either National Electric Code wiring violations or poorly grounded electric services serving the farms in question (J. Barrett, pers. comm.). Wind power projects and other electrical facilities can only create stray voltage if they are not properly designed, or during unusual circumstances.

3.9.1.4 Fire

Wind turbines, due to their height, physical dimensions, and complexity, have the potential to present response difficulties to local emergency service providers and fire departments. Although the turbines contain relatively few flammable components, the presence of electrical generating equipment and electrical cables, along with various oils (lubricating, cooling, and hydraulic) does

create the potential for fire or a medical emergency within the tower or the nacelle. This, in combination with the elevated location of the nacelle and the enclosed space of the tower interior makes response to a fire or other emergency difficult, and beyond the capabilities of most local fire departments and emergency service providers.

Other Project components create the potential for a fire or medical emergency due to the storage and use of diesel fuels, lubricating oils, and hydraulic fluids. Storage and use of these substances may occur at the substation, in electrical transmission structures, staging areas, and the O&M building/facility. The presence of high voltage electrical equipment also presents potential safety risks to local responders. See Section 3.11 for detailed information regarding emergency response services.

3.9.1.5 Lightning Strikes

Due to their height and metal/carbon components, wind turbines are susceptible to lightning strikes. Statistics on lightning strikes to wind turbines are not readily available, but it is reported that lightning causes four to eight faults per 100 turbine-years in northern Europe, and up to 14 faults per 100 turbine-years in southern Germany (Korsgaard & Mortensen, 2006). Most lightning strikes hit the rotor, and their effect is highly variable, ranging from minor surface damage to complete blade failure. All modern wind turbines include lightning protection systems, which generally prevent catastrophic blade failure.

3.9.1.6 Electrocution

Due to the generation and transmission of electricity, a wind power project poses the risk of electrocution. Because power generation and transmission does not occur until after the wind project has been constructed, this concern is primarily associated with an operating wind power project. The electricity generated by each turbine will be transmitted through buried and overhead 34.5 kV electric lines to the proposed substation. Buried lines will be placed at least four feet below grade in active crop/hay fields and at least three feet below grade in other areas; therefore, any earthwork conducted at or below these depths (and in the immediate proximity of the buried lines) will introduce the risk of electrocution by accidental contact. Transmission lines that run above ground along will be constructed in accordance with all applicable industry codes and standards.

3.9.1.7 Electric and Magnetic Fields

Electric power lines can create electric and magnetic fields (EMF) because they operate at high voltages and carry electric currents. EMF levels decrease as the distance from the source

increases. For an electric transmission line, EMF levels are highest next to the transmission lines (typically near the center of the transmission line right-of-way) and decrease as the distance from the transmission corridor increases. Electric fields are attenuated by objects such as trees and the walls of structures, and are completely shielded by materials such as metal and the earth. Thus, underground electric transmission lines do not produce electric fields at the ground surface. The strength of the magnetic fields, on the other hand, depend on the current in the conductor, the geometry of the construction, the degree of cancellation from other conductors, and the distance from the conductors or cables.

The strength of an electric field depends on the voltage of the conductor, the degree of shielding, and the distance from the conductors or cables. Underground electric cables do not produce electric fields at the ground surface because electric fields are attenuated by objects such as trees and the walls of structures, and are completely shielded by materials such as metal and the earth. The electric field produced immediately below a 34.5-kV overhead conductor (typically 30 to 40 feet above ground level) is quite low and the electric field decreases with lateral distance from the line.

The strength of magnetic fields, on the other hand, depends on the current in the conductor, the geometry of the construction, the degree of cancellation from other conductors, and the distance from the conductors or cables. Magnetic fields near underground cables are higher than overhead conductors, but fall off more rapidly with distance because of magnetic field cancellation from the close proximity of the buried cables. At distances greater than about 30 feet from the centerline, the underground cables produce fields lower than those of the overhead conductors, but both types of circuits have extremely low levels, far below applicable health-based exposure guidelines for public exposure.

3.9.1.8 Low Frequency Sound and Vibrations

Low frequency sound is somewhat arbitrarily defined, to be between 20 Hz and 200 Hz. There has been much debate over the alleged negative health effects caused by low frequency sound produced by operating wind turbines. As stated in Colby et al. (2009), the National Research Council reports that low frequency sound was a concern for older wind turbines where the blades were downwind of the turbine but not the modern upwind turbines. Work by Dr. Nina Pierpont postulates that there is a "Wind Turbine Syndrome" that affects some individuals living in the vicinity of modern wind turbines. The reported symptoms include headaches, nausea, sleep disturbance, tinnitus, ear pressure, vertigo, visual blurring, tachycardia, irritability, trouble with concentration and memory, panic attacks, internal pulsation, and quivering. These hypothesis have not been broadly

accepted by the international medical community. An independent review by the Chief Medical Officer of Ontario (2010) concludes: “While some people living near wind turbines report symptoms such as dizziness, headaches, and sleep disturbance, the scientific evidence available to date does not demonstrate a direct causal link between wind turbine noise and adverse health effects...Low frequency sound and infrasound from current generation upwind model turbines are well below the pressure sound levels at which known health effects occur. Further, there is no scientific evidence to date that vibration from low frequency wind turbine noise causes adverse health effects”. In addition, “Community engagement at the outset of planning for wind turbines is important and may alleviate health concerns about wind farms [and] concerns about fairness and equity may also influence attitudes towards wind farms and allegations about effects on health. These factors deserve greater attention in future developments. Reviews by Leventhall (2009), Roberts and Roberts (2009) and Colby et al. (2009) reached similar conclusions.

3.9.2 Potential Impacts

3.9.2.1 Construction

As previously mentioned, public safety concerns associated with Project construction include 1) the movement of large construction vehicles, equipment and materials, 2) falling overhead objects, 3) falls into open excavations, and 4) electrocution. These issues are most relevant to construction personnel who will be working in close proximity to construction equipment and materials, and will be exposed to construction related hazards on a daily basis. However, risk of construction related injury would be minimized through regular safety training and use of appropriate safety equipment.

The general public could also be exposed to construction-related hazards due to the passage of large construction equipment on area roads and unauthorized access to the work site (on foot, by motor vehicle, ATV, or snowmobile). The latter could result in collision with stockpiled materials (e.g., soil, rebar, turbine/tower components), as well as falls into open excavations. Because construction activities will occur primarily on private land, and be well removed from adjacent roads and residences, exposure of the general public to construction-related risks/hazard is expected to be very limited.

3.9.2.2 Operation

3.9.2.2.1 *Ice Shedding*

As stated previously, while turbine icing certainly will occur at times, any ice that accumulates on the rotor blades will likely cause an imbalance, or otherwise alert sensors, and result in turbine shut-

down. As the ice begins to thaw, it will typically drop straight to the ground. Any ice that remains attached to the blades as they begin to rotate could be thrown some distance from the tower. However, such a throw will usually result in the ice breaking into small pieces, and falling within 300 feet of the tower base. The Project's minimum setback distance of 500 feet between proposed turbines and public roads and non-participating property lines, and the typically observed setback of 1,250 feet between the proposed turbines and occupied residences, should adequately protect nearby residents and motorists from falling ice of any significant size.

In addition, unauthorized public access to the site will be limited by posting signs to alert the public and maintenance workers of potential ice shedding risks. Based upon the results of studies/field observations at other wind power projects, the Project's siting criteria, and the proposed control of public access to the turbine sites, it is not anticipated that the Project will result in any measurable risks to the health or safety of the general public due to ice shedding.

3.9.2.2.2 Tower Collapse/Blade Throw

Modern utility-scale turbines are certified according to international engineering standards. These include ratings for withstanding different levels of hurricane-strength winds and other criteria (AWEA, 2008b). The engineering standards of the wind turbines proposed for this Project are of the highest level and meet all federal, state, and local codes. In the design phase, state and local laws require that licensed professional engineers review and approve the structural elements of the turbines. State of the art braking systems, pitch controls, sensors, and speed controls on wind turbines have greatly reduced the risk of tower collapse and blade throw. The wind turbines proposed for the Project will be equipped with two fully independent braking systems that allow the rotor to be brought to a halt under all foreseeable conditions. In addition, the turbines will automatically shut down at wind speeds over the manufacturer's threshold of 25 m/s or 56 mph. They will also cease operation if significant vibrations or rotor blade stress is sensed by the turbines' blade monitoring systems. For all of these reasons, the risk of catastrophic tower collapse or blade failure is minimal.

3.9.2.2.3 Stray Voltage

While the concerns surrounding stray voltage are legitimate, it is important to note they are largely preventable with proper electrical installation and grounding practices. The Project's power collection system will be properly grounded, and will not be connected to the local electrical distribution lines that provide electrical service to on-site structures or off-site buildings and homes. It will be physically and electrically isolated from all of the buildings in and adjacent to the Project area. Additionally, the Project's buried electrical collection lines will be located a minimum of three

feet below ground (four feet in crop/hay fields), and will use shielded cables with multiple ground points. This design eliminates the potential for stray voltage (J. Barrett, pers. comm.).

3.9.2.2.4 *Fire*

All turbines and electrical equipment will be inspected by the utilities (for grid and system safety) prior to being brought on line. This, along with implementation of built-in safety systems, minimizes the chance of fire occurring in the turbines or electrical stations. However, fire at these facilities could result from a lightning strike, short circuit or mechanical failure/malfunction. Any of these occurrences at a turbine would be sensed by the System Control and Data Acquisition system and reported to the Project control center. Under these conditions, the turbines would automatically shut down and Project maintenance personnel would respond as appropriate.

In the event that a wind turbine catches fire, it is typically allowed to burn itself out while maintenance and fire personnel maintain a safety area around the turbine to protect against the potential for spot ground fires that might start due to sparks or falling material. Power from the circuit of the Project with the turbine fire is also disconnected; however, the other circuit(s) remains connected and operational. An effective method for extinguishing a turbine fire from the ground does not exist, and the events generally do not last long enough to warrant attempts to extinguish the fire from the air (Global Energy Concepts, 2005). However, since the public does not have access to the private land on which the turbines are located, risk to public safety during a fire event is essentially non-existent. This system should quickly extinguish any fires that occur at the Project substation and shut down power to the facility.

Generally, any emergency/fire situations at a wind turbine site or substation that are beyond the capabilities of the local service providers will be the responsibility of the Project owner/operator. Construction and maintenance personnel (and properly trained and equipped regional responders) will be trained and will have the equipment to deal with emergency situations that may occur at the Project site (e.g., tower rescue, working in confined spaces, high voltage, etc.). Consequently, such an incident would generally not expose local emergency service providers or the general public to any public health or safety risk.

3.9.2.2.5 *Lightning Strikes*

Lightning protection systems were first added to rotor blades in the mid 1990s, and are now a standard component of modern turbines (Korsgaard & Mortensen, 2006). These systems rely on lightning receptors and diverter strips in the blades that provide a path for the lightning strike to

follow to the grounded tower. Lightning is effectively and safely intercepted at several receptor points including the outermost blade tip and the blade root surface, and transmitted to the wind turbine's lightning conductive system. The turbines' blade monitoring system provides documentation of all critical lightning events. If a problem is detected, the turbine will shut down automatically, or at a minimum, be inspected to assure that damage has not occurred.

3.9.2.2.6 Electrocutation

As previously mentioned, buried electric lines will be at least three feet deep (four feet in crop/hay fields). This depth (4 feet in agricultural land), which conforms to NYSA&M guidelines, is below the plow depth of farm equipment. Therefore, agricultural activities are not anticipated to pose any risk of electrocution. Above ground electric lines will be installed complying to all codes and standards to minimize the potential risk. Therefore, the general public will not be exposed to risk from electrocution.

3.9.2.2.7 Electric and Magnetic Fields

As described in Section 3.10.1.7, EMFs are a combination of electric and magnetic fields generated by the operation of various Project components, including the turbine generator, electrical collection lines and transformers. The strength of an EMF is inversely proportional to the distance a sensor is from the Project component, so that the electric and magnetic field strengths decline as the distance from the component increases. The height of the turbine generator (over 300 feet) above the ground, the location of most electrical collection cables underground, and the location of substation transformers and other electrical equipment inside a fenced yard provide separation of these components from the general public to limit EMF exposure.

3.9.2.2.8 Low Frequency Sound and Vibrations

To determine potential sound impacts from the Project, a Noise Impact Assessment was conducted and results were presented in the Section 3.7.

The project will be designed and operated in accordance with the applicable code requirements.

3.9.3 Proposed Mitigation

3.9.3.1 Construction

Contractors will comply with Occupational Safety and Health Administration (OSHA) regulations, in addition to state worker safety regulations, regarding electricity, structural climbing, and other

hazards, during construction of the Project. To minimize safety risks to construction personnel, all workers will be required to adhere to a safety compliance program. The safety compliance program will address appropriate health and safety related issues including:

- personal protective equipment such as hardhats, safety glasses, orange vest, and steel-toed boots
- job safety meetings and attendance requirements
- fall prevention
- construction equipment operation
- maintenance and protection of traffic
- hand and power tool use
- open hole and excavation area safety
- parking
- general first aid
- petroleum and hazardous material storage, use, containment and spill prevention
- posting of health and safety requirements
- visitors to the job site
- local emergency resources and contact information
- incident reporting requirements

As mentioned in Section 3.8, a construction routing plan will be developed to assure that construction vehicles avoid areas or schedule deliveries where public safety could be a concern (schools, clusters of homes, etc.). To minimize safety risks to the general public, over-sized construction vehicles will be accompanied by an escort vehicle or flagman, as necessary to assure safe passage of vehicles on public roads. The general public will not be allowed on the construction site. After hours, vehicular access to such sites may be blocked by parked equipment, and temporary construction fencing or other visible barriers will be placed around excavations that remain open during off hours. The contractor will coordinate with local fire and emergency personnel to assure that they are aware of where various construction activities are occurring, and avoid potential conflicts between construction activity and the provision of emergency services (e.g., road blockages, etc.).

3.9.3.2 Operation

3.9.3.2.1 *Ice Shedding*

As stated previously, compliance with required setbacks and measures to control public access (gates, warning signs, etc.) should minimize any public safety risk associated with ice shedding. Atlantic Wind will also meet with local landowners and snowmobile clubs to explain the risks of ice shedding and proper safety precautions. Relocation of designated snowmobile trails that occur within 200 feet of a proposed turbine (if any) will be undertaken in coordination with the local snowmobile clubs and affected landowners. Additionally, icing of the sensors on the wind turbines will result in automatic turbine shutdown.

3.9.3.2.2 *Tower Collapse/Blade Throw*

The setbacks included in the Town of Clayton Wind Energy Facilities Law should assure that a tower failure would not endanger adjacent properties, roadways, or utilities. In addition, members of the public do not have access to the private land on which the turbines are located, and as previously stated, distance to the nearest public road/non-participating residence essentially eliminates risk to the public due to tower collapse/blade throw. Therefore, mitigation is not proposed.

3.9.3.2.3 *Stray Voltage*

Stray voltage will be prevented through proper design and grounding of the Project's electrical system. Although not anticipated, any reported stray voltage problems will be addressed through the Project's Complaint Resolution Procedure. Beyond this, additional mitigation is not proposed.

3.9.3.2.4 *Fire*

An employee safety manual will be incorporated into the overall operating and maintenance policies and procedures for the Project. Included in that manual will be specific requirements for a fire prevention program. In addition, a Fire Protection and Emergency Response Plan will be developed for the Horse Creek Wind Farm, and will include the following components:

- Initial and refresher training of all operating personnel (including procedures review) in conjunction with local fire and safety officials.
- Regular inspection of transformer oil condition at the step-up transformer installed at the main substation.
- Regular inspection of all substation components, including thermal imaging and other continuous monitoring techniques.

- Regular inspection of fire extinguishers at all facility locations where they are installed.
- All Project vehicles will be equipped with fire fighting equipment (fire extinguishers and shovels) as well as communications equipment for contacting the appropriate emergency response teams.
- The MSDS for all hazardous materials on the Project will be on file in the construction trailers (during construction) and the O&M facility (during operation), and provided to local fire departments and emergency service providers.
- The facility Safety Coordinator shall notify the local fire department of any situation or incident where there is any question about fire safety, and will invite an officer of the fire department to visit the workplace and answer any questions to help implement a safe operating plan.

Development and implementation of this plan will assure that Project construction and operation will not have a significant adverse impact on public safety, or the personnel and equipment of local emergency service providers.

3.9.3.2.5 Lightning Strikes

Beyond the turbines' lightning protection system, and the fire/emergency response plan described previously, no additional measures to mitigate the effects of lightning strikes are proposed.

3.9.3.2.6 Electrocutation

Atlantic Wind has committed to burying all electric lines a minimum of three feet below grade (four feet in crop/hay fields). All above ground lines will be constructed in strict accordance with all relevant regulations. Beyond these activities, no additional measures to mitigate the potential for electrocution are proposed.

3.9.3.2.7 Electro-magnetic Fields

Because no significant impacts from EMF are expected, no mitigation is necessary.

3.9.3.2.8 Low Frequency Sound

As mentioned previously, the automated vibration detection and shut down process provided by the SCADA system in addition to adherence to all appropriate design standards will effectively avoid and/or minimize any noise-related health risks during Project operation. Additional operational noise mitigation measures include siting turbines typically least 1,250 feet from all off-site residential

structures and keeping turbines in good running order throughout the operational life of the Project. However, if complaints should arise, they will be addressed through a complaint resolution procedure.

3.10 COMMUNITY FACILITIES AND SERVICES

Community facilities and services provided within and the vicinity of the Project area include public utilities, police and fire protection services, emergency medical services (EMS), health care facilities, education facilities, waste disposal, and recreational facilities. The level of services provided to the Project site was determined through review of publicly available online data or through telephone communications with State, County, Town, and School District personnel, including the State Police Department, County Sheriff's Department, County Emergency Services Coordinator, and local volunteer fire department.

3.10.1 Existing Conditions

Public Utilities and Infrastructure

Public utilities and infrastructure in the Project area include various overhead and underground facilities. Above-ground components include electric distribution and telephone lines, located along most of the public roads within the Project site. Cable television lines and communications towers, including radio broadcast antennas and cellular phone communications towers, also occur in and around the Project site. Underground utilities may include telephone and cable television lines and natural gas transmission lines.

Police Protection

The Jefferson County Sheriff and New York State Police have jurisdiction over the Project site. Both departments provide 24-hour coverage seven days per week. Jefferson County has a 911 Dispatch Center that dispatches all police, rescue, and fire calls and is located in the Metro-Jeff Public Safety Building on Waterman Avenue in Watertown.

The Clayton Village Police Department is located in the Clayton Municipal Building located at 425 Mary Street in Clayton. They have three part-time officers, three full-time officers, and one Department Chief. The Department provides law enforcement only to the Village of Clayton from 11 a.m. to 3 a.m. There is one patrol car on shift during the day, and two patrols cars during nighttime hours including one sergeant and one K-9 unit (Chief Patnode, pers. comm.).

The Jefferson County Sheriff's Department is located at 753 Waterman Drive in Watertown. They have twenty-six Deputy Sheriff's, nine detectives, five sergeants, and one lieutenant (www.co.jefferson.ny.us/index.aspx?page=105). There is one patrol car on duty for each shift for the Clayton area (Sgt. Cullen, pers. comm).

The New York State Police (Troop Division D, Zone 3) provides concurrent police service to the Project site and operates out of the primary station located in Alexandria Bay, as well as from their satellite station located in the Town of Orleans.

Fire Protection and Emergency Response

The Thousand Islands Emergency Rescue Service (TIERS) is the ambulance provider for the Town of Clayton. They are also the ambulance provider for the Clayton and LaFargeville Fire Departments. With 48 current members, TIERS paid staff paramedics provide coverage 24 hours a day, seven days per week and supplement their crews with volunteer EMTs and drivers. TIERS operates with three Advance Life Support Ambulances, all located at the Union Street headquarters in Clayton. They also have an ATV/snowmobile rescue trailer, Paramedic level fully-equipped fly car, three-unit TIERS EMS Bike Team, as well as advance life support equipment on Clayton Fire Department's "Last Chance" Maritime Unit. In 2006, TIERS had 29 calls in the town of Clayton and 13 mutual aid calls to surrounding areas (www.ti-rescue.org).

The Clayton Fire Department and the Depauville Fire Department provide fire protection services to the Project site. Fire and emergency services are provided 24 hours per day, seven days per week by volunteers dispatched from the Jefferson County 911 Center. The Clayton Fire Department is located on Graves Street in the Town of Clayton. The department has approximately 90 firefighters that respond to fire and rescue calls. The Clayton Fire Department apparatus includes one 1250 gpm pump Engine with 1000 gallons of water, one 1000 gpm pump mini type Engine, one 2000 gallon Tanker, one Heavy Rescue, extrication and high angle equipment onboard, one 100' ladder Aerial Truck with a 1000 gpm pump, and two Maritime boat units (www.claytonfiredepartment.org). The Depauville Volunteer Fire Department is located on School Street and serves approximately 1,000 residences (www.depauvillefd.org). The volunteer department provides fire and emergency support to 37 square miles surrounding the Hamlet of Depauville. Other nearby fire departments include the Dexter Fire Department on Canal Street in the Village of Dexter, the Brownville Fire Department on Brown Boulevard in the Village of Brownville and the LaFargeville Fire Department on Sunrise Avenue in LaFargeville.

Health Care Facilities

There are three hospitals in Jefferson County that provide health care services to the residents and visitors of the county. River Hospital, Inc. is located on Fuller Street in Alexandria Bay and is approximately 12.2 miles from the Project site. The hospital operates a primary care clinic, as well as emergency room, laboratory, physical therapy, respiratory therapy, radiology, ambulatory surgical care, and nutrition counseling services. The hospital provides 15 acute care beds and 9 swing beds and approximately 18 physicians on staff (<http://www.riverhospital.org>).

Samaritan Medical Center is located on Washington Street in Watertown and is approximately 10 miles from the Project site. This hospital is a member of the Samaritan Health System. This is a 287 bed acute care hospital that provides a wide range of services to the community, also serving as a regional referral center for Northern New York. There are approximately 166 physicians on staff who provide medical services including comprehensive cancer treatment, physical medicine and rehabilitation, high risk maternity and level II neonatal intensive care, neurosurgery, cardiac rehabilitation, trauma care, cardiac and pulmonary care, diagnostic cardiac catheterization and ambulatory surgery (www.samaritanhealth.com).

Carthage Area Hospital is located on West Street in Carthage and is approximately 21.2 miles from the Project site. This is a 78 bed, acute care hospital, and services including anesthesia, dentistry, family medicine, cardiology, emergency services, general surgery, internal medicine, ob/gyn, ophthalmology, orthopedics, pathology, pediatrics, podiatry, psychiatry, radiology, therapy services, urology, and vascular. The facility employs approximately 100 physicians (www.carthagehospital.com).

Educational Facilities

Two public school districts provide educational services to the population residing within and adjacent to the Project site. However, there are no public schools or facilities located in the Project site. The two school districts are LaFargeville Central School District (CSD) and Thousand Islands CSD. LaFargeville Central School (568 student population) is the only school within this district and is located in the Village of LaFargeville. The Thousand Islands CSD has four schools; Cape Vincent Elementary School (118 student population) located in Cape Vincent, and Guardino Elementary School (364 student population), Thousand Islands Middle School (255 student population), and Thousand Islands High School (358 student population), all located in the Town of Clayton. LaFargeville Central School is the closest school to the Project site, at a distance of approximately 2.4 miles (www.p12.nysed.gov).

Solid Waste Disposal

The nearest solid waste disposal facility is the Jefferson County transfer station located at 27138 NYS Route 12, approximately 13.2 miles southeast of the Project site. This facility accepts solid wastes and recyclables for county residents (<http://www.co.jefferson.ny.us>).

Parks and Recreation

Recreational opportunities in the vicinity of the Project site include bird watching, snowmobiling, bicycling, hiking, jogging, boating, hunting, fishing, picnicking, and sight seeing. Parks and recreational areas within 5 miles of the Project site include the Chaumont Bay, French Creek Wildlife Management Area (WMA), Perch River WMA, Ashland Flats WMA, Great Lakes/Seaway Trail, Chaumont River, Lucky Stars Lake, and numerous historic sites in the Village of Chaumont and Hamlets of LaFargeville and Stone Mills.

3.10.2 Potential Impacts

3.10.2.1 Construction

During construction, the Project will result in no significant increase in the demand for utilities such as telephone, natural gas, electric, water, or sanitary sewer. However, the Project will have a beneficial impact by generating a total of up to 96 MW of clean renewable energy.

Short term and minor impacts to existing electric distribution facilities may occur during the construction phase of the Project. National Grid owns the majority of the local overhead distribution poles and lines. Prior to the development of Project construction drawings, Atlantic Wind will share the Project layout with National Grid representatives in order to determine potential areas of conflict between existing utility lines and construction activities. Atlantic Wind will then contract a detailed survey (pole locations, line height, etc.) of all lines identified to have potential conflict. If conflicts cannot be avoided through minor shifts in access road alignment or the delivery route, National Grid will either have to temporarily raise, drop, or relocate any unavoidable lines. None of these activities will require new utility easements/rights of way.

The police, fire, and emergency response departments have adequate personnel and equipment to respond to basic emergency needs during construction of the Project. However, during construction, access to some area roadways may be temporarily blocked due to the presence of large construction and delivery vehicles. In addition, damage to the roadways caused by oversized/heavy equipment has the potential to reduce the response time of emergency personnel. This is not anticipated to be a significant problem due to the small number of residents within the Project site,

the general availability of alternate access routes, and correspondence and coordination that will occur between construction managers and local police and fire departments. The construction site could also experience vandalism/trespass problems that would require involvement of local police. However, based on experience with other wind power projects in New York State, this is not anticipated to be a significant impact.

Project construction will generate some solid waste, primarily plastic, wood, cardboard and metal packing/packaging materials, construction scrap, and general refuse. This material will be collected from turbine sites and other Project work areas, and disposed of in dumpsters located at the construction staging area(s). A private contractor will empty the dumpsters on an as-needed basis, and dispose of the refuse at a licensed solid waste disposal facility.

During construction, the Project will not adversely impact the local school districts, beyond the possible delay of school bus pick-ups and drop-offs at homes within the Project area due to construction traffic/activity. Atlantic Wind will coordinate construction travel routes with local school districts. Temporary construction workers will not create significant demand for school district services or facilities. These workers will also not generate a significant demand on local recreational facilities or other community services/facilities.

3.10.2.2 Operation

Once in operation, the Project will not result in any significant impacts to local utilities. Facility operation and maintenance will require energy use, but this impact will be minor because the amount of required electricity and fuel is small, and local fuel suppliers and utilities have sufficient capacity available to serve the Project's needs. As a result, no improvements to the existing energy supply system will be necessary. In addition, the Project will generate up to 96 MW of electric power and will advance New York State's goal of having 25% of the state's power provided by renewable sources by 2013.

No significant problems that would require response by local police, fire, and emergency service personnel are anticipated to result from Project operation. The wind turbines are located at least 500 feet from property lines and public roads, and 1,250 feet from off-site residences (unless the affected property owner provides written permission for a reduced setback). This is well outside of any area that could be affected in the unlikely event of a tower collapse or catastrophic blade failure. Although operation of the proposed Project could result in accidents that result in personal injury and/or property damage, their occurrence is relatively unlikely, and well within the response

capabilities of local emergency service providers. Local providers have experience in responding to fire and accidents in rural locations, including off-road areas used by hikers, ATV users, and snowmobilers. Public safety is discussed in detail in Section 3.10.

As described in Section 3.10, local fire departments do not have the specialized equipment necessary to respond to a fire in one of the turbines. Generally, any emergency/fire situations at a wind turbine site or substation will be the responsibility of the Project owner/operator. Operations and maintenance personnel will be trained and equipped to deal with emergency situations that may occur at the Project site (e.g., tower rescue, working in confined spaces, high voltage, etc.), and will coordinate such efforts with the local fire departments.

During Project operation, very little solid waste will be generated. Any waste that is generated will be placed in containers or dumpsters at the O&M facility and hauled away on a regular basis (e.g., weekly) by a private contractor. The waste will be disposed of at a licensed solid waste disposal facility.

The Project is not anticipated to result in a significant increase in the demand for educational services/facilities. While the operating Project will require up to eleven full-time employees, existing educational facilities/staff within the school districts are adequate to accommodate the addition of up to eleven families to the area.

3.10.3 Mitigation

The impacts to community services resulting from the proposed Project are not of the type or magnitude to require mitigation. In fact, development of the proposed Project will have a negligible impact on population, and place little demand on community services. At the same time, the Project will provide significant income and tax revenue to the Town, county, and school districts. This income will more than offset any incurred costs, and will assist with the financing of community services that benefit all residents of the town and county.

To mitigate any potential concerns regarding Project construction, Atlantic Wind will meet with the local emergency service personnel (fire, police, and EMS) prior to initiation of construction activities to review the planned construction process. During this meeting, unique construction equipment/material, construction traffic routing, and construction scheduling/phasing will be discussed. Prior to construction, Atlantic Wind will implement a coordinated emergency response plan, which will be developed in consultation with local emergency service personnel. The distance

and response time of some of the emergency response personnel will be taken into account when initially developing the coordinated emergency response plan, along with identifying where various construction activities will be concentrated, the provision of maps and other related materials requested by emergency responders, and the development of alternate response routes in the event that the primary route is blocked by construction activities. On-going communication between Atlantic Wind and local police, fire, and emergency services officials will help assure adequate levels of protection related to operation of the Project. The coordinated emergency response plan is anticipated to include:

- Initial and refresher training of all operating personnel (including procedures review) in conjunction with local fire and safety officials.
- Regular inspection of transformer oil condition at each step-up transformer installed at the main substation.
- Regular inspection of all substation components.
- Regular inspection of fire extinguishers at all facility locations where they are installed.
- All Project vehicles will be equipped with fire fighting equipment (fire extinguishers and shovels) as well as communications equipment for contacting the appropriate emergency response teams.
- The MSDS for all hazardous materials on the Project will be on file in the construction trailers (during construction) and the O&M facility (during operation).
- The facility Safety Coordinator shall notify the local fire department of any situation or incident where there is any question about fire safety, and will invite an officer of the fire department to visit the workplace and answer any questions to help implement a safe operating plan.

Atlantic Wind will coordinate with the local fire departments and emergency service agencies with regard to training, practice drills and documentation of appropriate actions in case of emergency circumstances at the Project site. Such documentation will include the locations of all emergency shutdown controls, location of any potentially hazardous materials, and site maps showing access routes. The Project sponsor will provide emergency plan updates to the Town of Clayton within four weeks after any changes in operation or facility occur.

Because the solid waste impacts of the Project will be minimal, and because the Project will utilize existing permitted disposal facilities (in accordance with applicable laws and the local town ordinances), the Project will not create any conflict with the county's solid waste management plan.

3.11 COMMUNICATION FACILITIES

To evaluate the potential for the Project to impact existing telecommunication signals, Comsearch was contracted to conduct analyses of AM/FM broadcast station operations and off-air TV reception in the vicinity of the Project site, and to notify the National Telecommunications and Information Administration (NTIA) of the proposed Project (see reports in Appendix Q).

3.11.1 Existing Conditions

3.11.1.1 Microwave Analysis

Microwave telecommunication systems are wireless point-to-point links that communicate between two sites (antennas) and require clear line-of-sight conditions between each antenna. Comsearch identified one microwave path in the vicinity of the Project site, that is located just beyond the southwest corner of the Project boundary (approximately 3.5 miles from the nearest turbine) (see Figure 1 in the Licensed Microwave Search and Worst Case Fresnel Zone Study in Appendix Q).

3.11.1.2 Off-Air Television Analysis

Comsearch conducted a television reception analysis and identified all off-air television stations within a 100-mile radius of the proposed Project (as measured from the approximate center of the Project site). Off-air television stations transmit broadcast signals from terrestrially located facilities that can be received directly by a television receiver or house-mounted antenna. The results of the study indicate that there are 217 off-air television stations within 100 miles of the Project site (see Appendix Q). One hundred twenty-seven of these are US stations and 90 of them are Canadian.

The most likely stations that will produce off air coverage to the Project site are those within a distance of approximately 40 miles or less. Comsearch concludes that given the service and coverage of the stations identified, the number of US stations available to the local communities is extremely limited. As a result, most residents in the area likely view television programming through the use of cable or a satellite dish.

3.11.1.3 AM and FM Broadcast Analysis

The Comsearch analysis determined that there are three AM stations and ten FM stations licensed within approximately 15 miles of the proposed Project. The three AM station antennas are located 10.84, 12.85, and 12.89 miles away from the nearest proposed wind turbine. Of the ten FM stations,

five are low power, four are medium power, and one is high power. The minimum distance between an FM station and a proposed wind turbine is 5.9 miles.

3.11.1.4 NTIA Notification

Comsearch sent a written notification of the proposed Project to the National Telecommunications and Information Administration (NTIA) of the U.S. Department of Commerce on December 28, 2006 (See Appendix H, Agency Correspondence), and an updated written notification was sent on January 4, 2011. Upon receipt of notification, the NTIA provides plans for the proposed Project to the federal agencies represented in the Interdependent Radio Advisory Committee (IRAC), which include the Department of Defense (DOD), Department of Education (DOE), Department of Justice (DOJ), and the Federal Aviation Administration (FAA). The NTIA then identifies any Project-related concerns during a 60-day review period.

3.11.1.5 Cellular, PCS, and LMR Systems

No formal study of cellular, personal communication system (PCS), or land mobile radio (LMR) coverage/use in the area was conducted. However, the area does have some cell phone coverage, and LMR is used by state, county, and local agencies and departments (police, fire, etc.) for vehicle-to-vehicle communications

3.11.2 Potential Impacts

3.11.2.1 Construction

Temporary communication interference as a result of Project construction may occur. Cranes used during construction activities (and the individual turbine components being raised by the cranes) can cause temporary obstruction of microwave links as well as some degradation to television and radio signals (L. Polisky, pers. comm.). However, because individual turbines have been sited to avoid interference with microwave paths that cross the Project, the potential for microwave interference by equipment assembling and erecting these turbines should be minimal. Any impact on television or radio reception caused by construction equipment would be temporary, as turbine assembly and erection at each turbine site is typically completed within 1 to 3 days.

3.11.2.2 Operation

3.11.2.2.1 *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 within a mathematical distance around

the center axis known as the Fresnel Zone. A Worse Case Fresnel Zone (WCFZ) was calculated for the microwave path identified to the southwest of the Project site. The WCFZ calculation only includes a horizontal analysis for each microwave path (i.e., its width). An analysis of the vertical limits of the Fresnel zone, to determine if it is actually above or below the proposed height of the turbines, was not conducted). The WCFZ was provided as a digital shapefile, which was used to guide initial turbine layout and will be used to guide final turbine layout (i.e., assuring that no turbine component is sited within the limits of the WCFZ). Therefore, Project operation is not anticipated to result in any interference to the microwave path that crosses southwest of the Project site (approximately 3.5 miles from the nearest turbine).

3.11.2.2.2 Television Systems

Comsearch examined the coverage of the identified off-air television stations within a 100-mile radius of the Project site and the potential for degraded television reception as a result of Project operation. The Comsearch report indicated that off-air stations located within 40 miles of the Project site are most likely to provide serviceable coverage for local residents. Of the 217 stations initially identified, 35 stations are located within the 40-mile range, 15 of which are Canadian stations. Of the 20 US stations located within the 40-mile range, only eight were licensed and operational at the time of the Comsearch analysis (December 2006). Of the eight licensed and operational US stations, three are full power analog stations, two are full power digital stations, and three are low power stations with limited coverage. Of the 15 Canadian stations, eight are analog and seven are digital stations. According to the Comsearch study, only the full power/full service analog and digital stations are capable of providing coverage to the area in the vicinity of the Project. The study concludes that due to the low number of US stations in the area and the potential lack of interest in the programming content of the Canadian stations, it does not appear that the off-air television stations are the primary mode of delivering television service to the local communities. Television service is more likely delivered through TV Cable service and/or direct satellite broadcast. Given that, the Project is not likely to result in significant impacts to television reception in the area. However, because some level of off-air coverage is provided to the area, impacts to existing television reception for some communities and/or individual receptors as a result of the Project are possible (i.e., those that rely exclusively on off-air coverage). Specifically, the loss of one or more of these stations to residents who rely only on off-air reception for television programming would likely represent a significant impact. These impacts would most likely include noise generation at low VHF channels within 0.5 mile of turbines, reduced picture quality (ghosting, shimmering), and signal interruption (NWCC, 2005).

3.11.2.2.3 Cellular, PCS and LMR Systems

Telephone mobile communications in the cellular and PCS frequency bands will not be significantly affected by the presence of the wind turbines. This is because the blockage caused by wind turbines is not destructive to the propagation of signals in these frequency bands. In addition, these systems are designed so that if the signal from (or to) a mobile unit cannot reach one cell, it will be able to reach one or more other cells in the network. Therefore, local obstacles are not normally a problem for these systems, whether they are installed in urban areas near large structures and buildings, or in a rural area near a wind energy facility. Similarly, the frequencies of LMR repeaters are generally unaffected by the presence of wind turbines. Very little, if any, change in the coverage of the repeaters will occur when the wind turbines are installed (L. Polisky, pers. comm.).

3.11.2.2.4 AM and FM Broadcast

Generally, the FM broadcast audio signal is not noticeably affected by wind turbines because the signal modulation is frequency modulated (FM) and the wind turbines have the affect of varying the amplitude of the signal, which will produce distortion to an amplitude modulated (AM) signal but not to a FM signal. Also, changes to audio coverage or distortion are not readily apparent to a listener when factored together with other causes of degradation such as being out of range of the station or signal fades. Since the FM Station antennas are located greater than 5.9 miles from the Project site, impacts to the coverage of these stations will be essentially non-existent. Additionally, AM Station antennas are at least 10.8 miles from the Project turbines, therefore no degradation of the AM broadcast coverage is anticipated to occur.

3.11.2.2.5 NTIA Notification

In a letter sent to Comsearch (dated February 2, 2007), the NTIA stated that they did not identify any concerns related to signal blockage following their review. Therefore, impacts to the IRAC radio frequency transmissions are not anticipated. This letter is included in Appendix H. The Project sponsor sent an updated NTIA Notification on January 4, 2011, which is currently undergoing a 60-day review process. No impacts to the IRAC radio frequency transmissions are anticipated.

3.11.3 Proposed Mitigation

3.11.3.1 Construction

If disruptions to existing communication systems occur as a result of Project construction, they will be temporary, and will only occur during the erection of specific turbines. Because turbine installation/crane activity will occur at different locations and at different times during the construction

period, any degradation/disruption to existing communications will not represent a constant interference to a given television/radio reception area or microwave signal (L. Polisky, pers. comm.). In addition turbine erection will be performed as efficiently as possible (under favorable conditions, one turbine can be erected in one day). Therefore, mitigation for construction interference is not warranted.

3.11.3.2 Operation

3.11.3.2.1 *Microwave Communication Systems*

The Project, as currently proposed, will not impact existing microwave communications. If future turbine layout revisions are necessary, the new layout will be designed so as not to interfere with existing microwave paths. Beyond this, additional mitigation is not necessary and is therefore not proposed.

3.11.3.2.2 *Television Systems*

If Project operation results in any impacts to existing off-air television coverage, the developer/operator will address problems through a compliant resolution process coordinated with the Town of Clayton. Mitigation actions could include adjusting existing receiving antennas or possibly upgrading either the antenna or the cable connecting the antenna to the television. In addition, the FCC's mandate to transition all off-air television broadcasts from analog signals to digital signals by February 2009 will eliminate any turbine-related contrast variation (shimmering), thus reducing the potential for television signal interference from wind turbines (L. Polisky, pers. comm.).

3.11.3.2.3 *Cellular, PCS and LMR Systems*

If a cellular or PCS company were to claim that their coverage had been compromised by the presence of the proposed Project, coverage could be restored by installing an additional cell or an additional sector antenna on an existing cell for the affected area. Utility, meteorology, and/or the turbine towers within the Project site could serve as the structure platforms for the additional cellular or PCS base station or sector antennas. Similarly, if there is a reported change in LMR coverage in the area, it can be easily corrected by repositioning or adding repeaters that operate with the LMR mobile systems. This could be accomplished by adding or positioning the repeaters at locations within the Project site. Repeater antennas could also be installed on utility or the meteorological tower within the Project site, if needed.

3.12 LAND USE AND ZONING

Land use and zoning in the Project site was determined through review of local town codes, tax parcel maps, aerial photographs, and field review conducted during 2006 and 2010. Land use and zoning are discussed in terms of regional land use patterns, Project site land use and zoning, agricultural land use, and future land use.

3.12.1 Existing Conditions

3.12.1.1 Regional Land Use Patterns

The Town of Clayton is located in western Jefferson County, northwest of Watertown and the Fort Drum area (the two Jefferson County major population areas). The inland areas in this portion of Jefferson County are primarily rural and dominated by active and reverting agricultural land, forestland, and widely scattered rural homes and farms. Most of the agricultural land in this region of New York State is devoted to dairy farming, and to a smaller extent livestock and crop production, and a significant amount of agricultural land has gone out of production over the last 20 years. Much of this land has succeeded back to shrub or forest land (or is in the process), and many forested tracts are managed for the production of timber products (saw logs, chips, pulp, etc.), and are being actively logged. Areas of Jefferson County along the St. Lawrence River and Lake Ontario are characterized by waterfront recreational, residential and retail tourism activity. Areas of development are concentrated in small hamlets and villages, in waterfront communities, and along the existing network of state, county, and local roads. Most of this development is residential, but also includes recreational and retail business associated with tourism activity in the Thousand Islands Region and along Lake Ontario communities.

3.12.1.2 Project Site Land Use and Zoning

Active farms, reverting agricultural land, managed forestland, and single-family rural residences are the dominant land uses within the Project site. The majority of the area consists of open crop fields (primarily hay and corn) and pastures, with forested areas generally confined to small woodlots and stream corridors. However, a few areas of relatively large, contiguous forest tracks (up to approximately 500 acres) can be found. The Project site also includes successional old-field, hedgerow, successional shrubland, residential yards, farms, streams and ponds. These land uses are consistent with the regional land use characteristics described above, and together define community character within the majority of the Project site. Existing built features within the Project site include roads, single-family homes, barns, silos, and other agricultural buildings. Within and immediately adjacent to the Project site, residential and small commercial development is primarily

concentrated in the hamlets of Depauville and LaFargeville. Rural residential development within the area, consisting primarily of individual single-family homes and farmhouses, generally occurs along the frontage of state and county highways and local public roads. Many of these homes are of an older vintage with new home construction being fairly limited. Other than farms, commercial and industrial development within the Project site appears to be limited to resource extraction (logging) and scattered rural or home-based businesses (e.g. sawmills, lumber yards, auto salvage yards, etc.).

According to the New York State Office of Real Property Services (NYSORPS), the Project site consists of seven distinct land use types. The majority of the Project site (approximately 5,056 acres [53.5%]) is categorized as agricultural, which is described by the NYSORPS as "property used for the production of crops or livestock". Approximately 2,526 acres (26.7%) of the Project site is characterized as residential, which is described as "property used for human habitation." Vacant land, which constitutes approximately 1,513 acres (17.3%), is described as "property that is not in use, is in temporary use, or lacks permanent improvement." Other land uses on-site include commercial (4 acres or <0.1%) described as "property used for the sale of goods and/or services," community services (8 acres or 0.1%) described as "property used for the well being of the community," and public services (8 acres, or 0.1%) described as "property used to provide services to the general public". Additionally, 130 acres (1.4%) of the Project site is categorized as wild, forested, conservation lands and public parks, defined as "Reforested lands, preserves, and private hunting and fishing clubs. The remaining 1.1% of the Project area is occupied by public roads. (NYSORPS, 2008).

The Town of Clayton Land Use Regulations (1999, amended 2005) define eight land use management districts within the town: 1) Residential, 2) Marine Residential, 3) Marine Development, 4) Agricultural and Rural Residential, 5) Hamlet, 6) Business, 7) Industrial, and 8) Conservation. The Residential district was established to provide a residential district of moderate density and limited accessory uses. The Marine Residential district allows for seasonal and year round waterfront setting residential development compatible with protection of the aesthetic and environmental quality of the St. Lawrence River and its tributary waters. The Marine Development district is intended to provide marine-dependent and commercially related uses in the St. Lawrence River area and its tributaries. The Agricultural and Rural Residential district (which covers the entire Project area within the Town of Clayton) was established to provide a low-density mix of agricultural and rural

residential uses with compatible accessory structures in an effort to maximize preservation of rural open space. The Hamlet district allows a compatible mix of residential and commercial uses in rural population centers. The purpose of the Business district is to provide a safe and efficient setting for business and commercial uses while minimizing conflicts with residential areas. The industrial district allows for industrial activities that are compatible with the overall nature of the Town of Clayton. Finally, the Conservation district secures the appropriate use of environmentally sensitive or scenic lands, and preserves other natural areas.

The Town of Clayton also has a local law governing Wind Energy Facilities (Local Law No. 1 of 2007). Accompanied by the establishment of a Wind Power Overlay District, this ordinance provides the Town of Clayton Planning Board with the authority to regulate the placement of wind energy conversion systems (WECS). Wind energy facilities are allowed, pursuant to the approval of a wind energy facility application by the Planning Board and subsequent issuance of a permit. If approved, the permit allows for the construction, maintenance, and operation of a Wind Energy Facility. The requirements of the Wind Energy Facilities Law in the Town of Clayton is summarized as follows:

- The maximum total height of any WECS shall be 500 feet
- Setback of 500 feet from the nearest public highway
- Setback of 1,250 feet from any the nearest offsite residence, hospital, school, church or public library
- Operating WECS sound pressure levels (L_{10}) shall not exceed 50 dBA as measured at any off-site residence, school, hospital, church or public library existing on the date of the WECS application.
- The applicant shall submit and receive approval for a decommissioning plan.
- The applicant shall submit a complaint resolution process and make every reasonable effort to resolve complaints.
- The WECs should be lit only to the minimum level to comply with FAA requirements.
- Stormwater run-off and erosion control shall be managed in a manner consistent with State and Federal laws and regulations.
- Turbine blades shall pass no closer than 30 feet to the ground during operation.

3.12.1.3 Agricultural Land

The 2007 Census of Agriculture reported that 890 working farms occupied 259,600 acres in Jefferson County, or 22% of the land in the county. Of the total farmland in the county, 63% is classified as cropland (USDA NASS, 2010). According to the U.S. Census Bureau, less than 1% of

the Jefferson County population (436 residents) listed farming, fishing, or forestry as their occupation. Similarly, 11 residents within the Town of Clayton (>1%) indicated farming, fishing, or forestry as their primary occupation (U.S. Census Bureau website).

Jefferson County has a total of 16 designated agricultural districts, and portions of two districts (Districts 08 and 09) occur within the Project site. Approximately 32.8% of the Project site is located within these districts. Agricultural land is a significant component of the Project site with approximately 4,155 acres of the 9,450-acre area (44%) in row crops, field crops, or pastureland (existing conditions based upon vegetative community mapping is discussed in Section 3.3).

3.12.1.4 Future Land Use

Other than the proposed Project, future land use patterns in the area are anticipated to remain largely unchanged for the foreseeable future. The Jefferson County Chamber of Commerce continues to promote agriculture, tourism, and recreation as growth opportunities. In response to an increased population in the Watertown and Fort Drum areas of Jefferson County, and an overall aging population in the region, an economic development strategy committee was formed and in 2006 circulated a “blueprint” for county economic development action. The goals of the action plan include retaining a young local work force, sustaining local tourism and recreational infrastructure, and promoting encourage investment in agri-tourism and the agricultural industry.

Current land use patterns in the Town of Clayton are expected to remain, with a future emphasis on those uses defined in the local zoning ordinance.

3.12.2 Potential Impacts

The Project will be compatible with the agricultural land use that dominates the Project site. However, there will be temporary, construction-related impacts, as well as permanent impacts (operation related) to land uses within the Project site and the larger community. Anticipated land use and zoning impacts are described below.

3.12.2.1 Construction

Construction-related disturbance to lands classified as agricultural use, will total approximately 349.5 acres (impacts based upon vegetative community mapping are discussed in Section 3.3). Along with this direct impact to agricultural land, movement of equipment and material could result in damage to growing crops, damage to fences and gates, damage to subsurface drainage systems (tile lines), and temporary blockage of farmers’ access to agricultural fields. However, wind turbines

and associated facilities have been located so as to minimize loss of active agricultural land and interference with agricultural operations, and construction activities will be in accordance with the NYS&M Guidelines for Agricultural Mitigation for Wind Power Projects.

In addition, construction will result in disturbance of approximately 78.5 acres of land categorized as residential, and 70.5 acres of land categorized as vacant. Impacts to residential land are confined to the properties of participating landowners. No impacts to land categorized as commercial, community services, public services, or wild, forested, conservation lands & public parks are anticipated.

Construction activities could have temporary impacts on forest management/timber harvest activities. Movement of equipment and materials could temporarily block or damage forest access roads. Timber harvest activities may also need to be curtailed/rescheduled in certain areas to avoid interfering with Project construction. It is anticipated that any marketable timber that results from forest clearing activities will be salvaged and stockpiled for use/removal by the landowner. Construction impacts to forestland have also been minimized by siting turbines in previously disturbed areas and using the existing network of forest roads, log landings, and skid trails to accommodate proposed access road and interconnect routes. Improvements to existing roads to accommodate construction activity will ultimately enhance access to these properties for future forest management activities.

Construction activity will be in compliance with the requirements of the local Wind Energy Facility ordinance of Clayton. No variance from the construction-related requirements of the local law is anticipated.

3.12.2.2 Operation

The Project as proposed is consistent with existing land use patterns within the Town of Clayton and will be constructed in compliance with the Town's zoning/wind energy facility regulations. The Project will occur entirely on private land in areas dominated by active and reverting agricultural land and managed forestland. Project components will be sited in accordance with local setback requirements and no public lands or recreational facilities will be impacted. Therefore, impacts to residential, commercial, and recreational land use will be minimized. The operating Project will be largely compatible with agricultural land use, which dominates the central and southern portions of the Project site, and may serve to help keep land within agricultural use. Russell Cary, Supervisor of the Town of Fenner, New York, believes that lease payments from the wind power project in Fenner

are helping to preserve a rural lifestyle and protect family farms from being taken over by large-scale commercial farming operations (R. Cary, pers. comm.), which is also a goal of the Town of Clayton and Jefferson County.

Only very minor changes in land use within the Project site are anticipated as a result of Project implementation. The 48 turbine sites, substation, and other ancillary facilities represent the cumulative conversion of approximately 48.5 acres of land from its current use. Of these 48.5 acres, approximately 40 acres are categorized as agricultural by the NYSORPS, 6.5 acres are categorized as residential, and 6 acres are categorized as vacant.

During Project operation, additional impacts on land use should be infrequent and minimal. Other than occasional maintenance and repair activities that could have impacts similar to those described in Section 2.5 (Project Construction), the Project should not interfere with on-going land use (e.g., farming activities). As mentioned, by supplementing the income of participating farmers, the Project will help keep farms in operation and the land in agricultural use. The presence of wind turbines may also limit or prevent the conversion of agricultural land to seasonal or permanent residential use.

However, as noted in the visual impact assessment in Section 3.5, the Project will result in a perceived change in land use in many areas of the town. The remote or rural character of the area will be impacted in those locations where a significant number of the proposed turbines can be seen, or where the turbines can be viewed from foreground distances (i.e., under 0.5 mile).

3.12.3 Proposed Mitigation

The Project is generally consistent with existing zoning and is compatible with the agricultural and vacant land use that dominates the Project site. However, the Project will impact agricultural activities (at least temporarily) and will result in a significant change to community character and perceived land use throughout the area.

To minimize and/or mitigate impacts to active agricultural land and farming operations, Project siting and construction will fully comply with NYSA&M Guidelines for Agricultural Mitigation for Wind Power Projects. These protection measures include:

- Limiting permanent road widths to a maximum of 16 feet, and where possible, following hedgerows and field edges to minimize loss of agricultural land.

- Having roads that must cross agricultural fields stay on ridge tops and other high ground to minimize cut and fill as well as potential drainage problems.
- Avoiding disturbance of surface and subsurface drainage features (ditches, diversions, tile lines, etc).
- Prohibiting vehicular access to turbine sites until topsoil has been stripped and permanent access roads have been constructed.
- Constructing roads only in a location and manner approved by the environmental monitor.
- Prohibiting stripping of topsoil or passage of cranes across agricultural fields during saturated conditions when such actions would damage agricultural soils.
- Avoiding blocking of surface water drainage due to road or installation or stockpiled topsoil.
- Maintaining access roads throughout construction so as to allow continued use/crossing by farmers and farm machinery.
- Temporarily fencing open excavation areas in active pastureland to protect livestock.
- Disposing of excess concrete offsite (unless otherwise approved by the environmental monitor and the landowner). Under no circumstances shall excess concrete be buried or left on the surface in active agricultural areas.
- Washing of concrete trucks outside of active agricultural areas in locations approved by the environmental monitor.
- Restricting erection cranes to designated access roads, crane paths, and work pads at the structure sites for all set-up, erection, and breakdown activities.
- Stabilizing restored agricultural areas with seed and/or mulch.
- Removing and disposing of all construction debris offsite at the completion of restoration.

Beyond reducing impacts to agricultural land, other mitigation measures will be undertaken to reduce the impact of the wind energy facilities on land use and zoning (including full compliance with the Town of Clayton local law regulating the development of Wind Energy Facilities). These include:

- Locating all electrical collection (interconnect) lines underground to the maximum extent practicable, or siting above ground lines in hedgerows or out of areas being actively cultivated, where possible.
- Lighting towers only to the extent necessary to comply with FAA requirements. Lighting for the substation and other ground level facilities will be kept to a minimum and generally operated by switch or motion detector.
- Utilizing tubular towers and finishing structures with a single, non-reflective matte finish color.
- Avoiding use of guy wires on permanent wind measurement towers.

- Installing turbines in locations where proximity to existing fixed broadcast, retransmission, or reception antenna for radio, television, or wireless phone or other personal communications systems will not produce electromagnetic interference with signal transmission or reception.
- Designing all Project components in a way that minimizes the impacts of land clearing and the loss of open space. Land protected by conservation easements is being avoided.
- Locating Project components so as to minimize impacts on state and federal jurisdictional wetlands.
- Managing storm water run-off and erosion control in a manner consistent with all applicable state and federal laws and regulations.
- Removing all solid waste, hazardous materials, and construction debris from the site and managing its disposal in a manner consistent with all appropriate rules and regulations.
- Generally limiting construction to the hours of 7 a.m. to 7 p.m., in accordance with the local laws.

These actions will assure that adverse impacts on land use and zoning are minimized or mitigated to the extent practicable.

4.0 UNAVOIDABLE ADVERSE IMPACTS

The proposed Project will result in significant long-term economic benefits to participating landowners, as well as to the Town of Clayton, the local school districts, and Jefferson County (see Section 3.9). When fully operational, the Project will provide up to 96 MW of renewable electric power with no emissions of pollutants or greenhouse gases to the atmosphere. The development of the Project is consistent with surrounding land uses and will help maintain the area in agricultural and open space use.

Despite the positive effects anticipated as a result of the Project, its construction and operation will necessarily result in certain unavoidable adverse impacts to the environment. The majority of the adverse environmental impacts associated with the Project will be temporary, and will result from construction activities. Site preparation (e.g., clearing, grading), improvement of local roads, and the installation of roads, turbines, electrical interconnects, staging areas, the O&M facility, meteorological tower, and the collection substation/interconnection station will have short-term and localized adverse impacts on the soil, water, agricultural and ecological resources of the Project site. This construction will also have short-term impacts on the local transportation system, air quality, and noise levels. These impacts will largely result from the movement and operation of construction equipment and vehicles, which will occur during the approximately nine-month development of the Project. The level of impact to each of these resources has been described in Section 3.0 of the DEIS and will generally be localized and/or of short duration.

Long-term unavoidable impacts associated with operation and maintenance of the Project include turbine visibility from many locations within the town and surrounding areas. The presence of the turbines will result in a change in perceived land use from some areas. The Project also may help maintain land within the Project site in agricultural use, thus protecting agricultural resources, open space and existing land use patterns. Project development will also result in an increased level of sound at some receptor locations (residences) within the Project area, a minor loss of agricultural and forest land, wildlife habitat changes, and some level of avian and/or bat mortality associated with bird/bat collisions with the turbines. As described in Section 3.0, these impacts range in significance from minor to significant and potential impacts to some bird and bat species may require implementation of appropriate mitigation measures.

Although adverse environmental impacts will occur, they will be minimized through the use of various general and site-specific avoidance and mitigation measures. With the incorporation of

these mitigation measures, the Project is expected to result in positive, long-term beneficial overall impacts that will offset the adverse effects that cannot otherwise be avoided.

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

4.1 GENERAL AVOIDANCE AND MITIGATION MEASURES

General mitigation measures include compliance with the conditions of various local, state, and federal ordinances and regulations that govern Project development, as well as the inherent characteristics of the Project. The primary government review/approval processes that apply to the Project include:

- SEQRA (Town of Clayton)
- NYSDOT and Jefferson County Highway Department regulations.
- Federal Clean Water Act regulations (Section 404 permit, Section 401 water quality certification) including corresponding required agency consultations with the US Fish and Wildlife Service for potential impacts to threatened or endangered species.
- Town of Clayton Wind Energy Facilities Law (Local Law No. 1 of 2007).
- NYSDEC water resources regulations (Environmental Conservation Law, Article 24 and Article 15; Section 401 water quality certification).
- NYSDEC threatened and endangered species protection regulations (Article 11).
- SHPO cultural resources review (National Historic Preservation Act of 1966 and the New York State Historic Preservation Act of 1980).
- NYSDEC SPDES regulations (stormwater management).
- Occupational Safety and Health Administration (OSHA) regulations (standard conditions for safe work practices during construction).
- NYS Agricultural Districts law.

SEQRA regulations require environmental review of proposed development projects so that potential adverse impacts and public concerns can be identified prior to Project implementation and avoided or mitigated, to the extent practicable. This DEIS was prepared in accordance with these regulations, and provides a primary means by which the potential costs and benefits of the Project are described and weighed in a public forum. Compliance with SEQRA regulations will assure that public and agency comments are solicited and appropriately addressed, Project alternatives are

evaluated, and potential adverse impacts are identified and mitigated to the extent practicable. Response to comments and preparation of a Final Environmental Impact Statement (FEIS) will provide the information necessary for the lead agency and other involved agencies to draw conclusions (Findings Statement) regarding the Project's overall environmental impacts and impose conditions on its approval, if necessary.

Compliance with the other various federal, state, and local regulations governing the construction and design of the proposed Project also will serve to minimize adverse impacts. Construction activities and building designs will be in compliance with state and local building codes and federal OSHA guidelines to protect the safety of workers and the public. State and Federal permitting required by the NYSDEC and the USACOE will serve to protect water resources and wildlife habitat, while state and county highway permitting will assure that safety, congestion, and damage to highways in the area is avoided or minimized. Compliance with town/county ordinances that may require building and highway permits will further serve to minimize impacts of the Project. The Town of Clayton Wind Energy Facilities Law contains protective requirements for the siting and regulation of wind power projects that are consistent with (or exceed) the requirements found in other local wind power ordinances in New York State.

Along with regulatory compliance, the final Project layout will be in accordance with various siting criteria, guidelines, and design standards that serve to avoid or minimize adverse environmental impacts. These include:

- Siting the Project away from population centers and areas of residential development.
- Siting turbines in compliance with all local set-back requirements to minimize noise, shadow flicker, and public safety concerns.
- Following NYSA&M's Guidelines for Agricultural Mitigation for Wind Power Projects.
- Avoiding streams and wetlands, or utilizing existing disturbed areas for stream and wetland crossings to the maximum extent practicable.
- Siting turbines primarily in open field areas to minimize forest clearing and impacts to habitat.
- Using existing farm roads for turbine access whenever possible, to minimize impacts to soil, ecological, and agricultural resources.
- Minimizing overhead transmission lines and designing any overhead transmission line in accordance with Avian Power Line Interaction Committee (APLIC) guidelines to minimize impacts on birds.

- Project design, engineering, and construction will be in compliance with various codes and industry standards to assure safety and reliability.
- Limiting turbine lighting to the minimum allowed by the FAA to reduce nighttime visual impacts, and following lighting guidelines to reduce the potential for bird collisions.
- Construction procedures will follow Best Management Practices for sediment and erosion control.
- Turbines will include grounding and automatic shutdown/braking capabilities to minimize public safety concerns.

4.2 SPECIFIC MITIGATION MEASURES

Project development and operation will also include specific measures to mitigate potential impacts to specific resources. These were described in detail in Section 3.0, but generally include the following:

- Developing and implementing a complaint resolution procedure to address landowner concerns throughout Project construction and operation.
- Developing and implementing various plans to minimize adverse impacts to air, soil, and water resources, including a dust control plan, sediment and erosion control plan (see Preliminary SWPPP in Appendix E, which includes a draft Spill Prevention, Control, and Countermeasure Plan)
- Undertaking a pre-construction breeding bird survey to avoid impacting any nesting listed species during construction.
- Documentation of existing road conditions, development of a road improvement plan, and undertaking public road improvement/repair, where necessary, at no cost to the town or county.
- Post-construction avian and bat monitoring studies to document Project impacts on birds and bats.
- A historic resource mitigation program to be developed in consultation with the SHPO.
- 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.
- Development of an emergency response plan with local first responders.

4.3 ENVIRONMENTAL COMPLIANCE AND MONITORING PROGRAM

In addition to the mitigation measures described above, Atlantic Wind will develop an environmental compliance program and employ one on-site environmental monitor to oversee compliance with

environmental commitments and permit requirements. The environmental compliance program will be similar to that utilized on Iberdrola Renewable's Hardscrabble Wind Farm in Herkimer County (EDR, 2010) and will include the following components:

1. Planning – Prior to the start of construction, the environmental monitor will review all environmental permits and, based upon the conditions/requirements of the permits, prepare an environmental management document that will be utilized for the duration of the Project. This document will outline environmental requirements for construction and restoration included in Project permits and approvals.
2. Training – The environmental monitor will hold environmental training sessions that will be mandatory for all contractors and subcontractors. The purpose of the training sessions will be to explain the environmental compliance program in detail prior to the start of construction.
3. Preconstruction Coordination – Prior to construction, the contractor(s) and the environmental monitor will conduct a walkover of areas to be affected by construction activities. This walkover will identify landowner restrictions, sensitive resources, limits of clearing, proposed stream or wetland crossings, and layout of sediment and erosion control features. The limits of work areas, especially in sensitive resource areas, will be defined by flagging, staking, or fencing prior to construction, as needed.
4. Construction and Restoration Inspection – The monitoring program will include the inspection of construction work sites by the environmental monitor. The monitor will be present during construction at environmentally sensitive locations, will keep a log of daily construction activities, and will issue periodic/regular reports summarizing monitoring activities. Additionally, the monitor will work with the contractors to create a punch list of areas for restoration in accordance with issued permits. Following construction, Atlantic Wind or an environmental monitor will periodically monitor for two years following completion of site restoration (in accordance with NYSA&M requirements) to evaluate areas disturbed during construction and assure that agricultural resources are restored and maintained over the long term.

5.0 ALTERNATIVES ANALYSIS

This section evaluates alternatives to the proposed action, including the methodology and criteria applied for selecting the overall Project site, as well as individual turbine locations. The alternatives offer a potential range and scope of development and are evaluated in the level of detail to allow for comparative analysis and consideration, as prescribed by the SEQRA provisions explained below.

5.1 SEQRA ALTERNATIVES ANALYSIS REQUIREMENTS

SEQRA (6 NYCRR Part 617) requires that an EIS evaluate reasonable project alternatives. In determining the scope of alternatives to be considered, the emphasis is on what is "reasonable". As described in §617.9 (b)(5)(v), an EIS must contain a description and evaluation of the range of reasonable alternatives to the action that are feasible, considering the objectives and capabilities of the Project sponsor. As stated in Section 2, the objective of the proposed action is to take advantage of the unique wind resource in the Horse Creek Project site and New York bulk power transmission system availability, in order to create an economically viable wind-powered electrical-generating facility that will provide a significant source of renewable energy to the New York power grid, as well as benefits to the local community and taxing jurisdictions.

The Project's location east of Lake Ontario and the St. Lawrence Seaway places it in a unique position to assist the State in meeting many policy objectives (including the State Energy Plan, Renewable Portfolio Standard targets and other Executive Orders¹) encouraging the development of renewable energy and wind projects while minimizing potential environmental impacts and impacts of local concern typically associated with wind-powered electric generating facility siting, including visual and noise impacts. The goal of the Project is to take maximum advantage of the unique wind resource within the Project area, which is one of the few viable locations in New York with a Class III wind resource² and the ability to construct a facility with a nameplate capacity of 96 MWs of wind powered renewable energy.

¹ The New York State Energy Plan can be found at www.nysenergyplan.com. Former Governor Paterson's Executive Order No. 24 can be found at http://www.state.ny.us/governor/executive_orders/xeorders/eo_24.html. A description of the New York Renewable Portfolio Standard can be found on NYSERDA's website at <http://www.nyserda.org/rps/index.asp> and on the NYSPC's website at <http://www3.dps.state.ny.us/W/PSCWeb.nsf/All/1008ED2F934294AE85257687006F38BD?OpenDocument>

²One way wind at a potential site is measured is by calculating the wind power density. The wind power density, measured in watts per square meter, indicates how much energy is available at the site for conversion by a wind turbine. This number is then classified into 7 recognized "classes" to indicate the relative strength of the wind resource at a particular site (Class 1-7). A high class indicates a stronger wind resource. In general, sites with a Wind Power Class rating of 3 or 4 or higher are preferred for large-scale wind facilities.

As a general matter, wind project developers in New York that have secured site control generally aim to maximize the size of the project in order to take advantage of a favorable wind resource which is relatively rare in NY. This is a prudent approach as economies of scale generally lower costs and the concomitant price a project operator must charge for energy produced, making a project more competitive and capable of delivering lower cost energy to the grid as well as potentially maximizing the return on investment. Furthermore, such projects are generally in a position to support a larger investment in local communities, through PILOT payments or other community benefit enhancements, than smaller projects. Here, for example, the PILOT will provide payment of approximately \$768,000 annually to the local taxing jurisdictions. The key parameters for a favorable site in New York are:

- sites located in jurisdictions where the local governments in charge of permitting are not opposed to wind development;
- sites that demonstrate an adequate wind resource;
- sites where landowners are willing to enter agreements allowing use of their land for project development (turbine construction and operation);
- sites that are located proximate to power grid interconnections with bulk power lines having the capacity to accept electric generation from the project without excessive upgrade costs;
- sites that are located on areas that do not have undue environmental and cultural restraints.

In the case of wind powered electric generation facilities, the facilities are best sited where a unique (Class 3 minimum) wind resource can be found. In short, like other public utility infrastructure, wind turbines are very location sensitive and must be located where the wind resource is in order to utilize the resource and provide the service. New York has limited locations with an adequate wind resource for project development and those are mostly in the northern and western regions of the state (www.awstruewind.com/inner/windmaps/NewYork.htm). However, even these limited locations are further reduced by virtue of the fact that many sites in these locations do not have the other essentials for development mentioned above or have a limited availability of one or more of these essential features. Thus, taking into account the above factors, Atlantic Wind submitted a 126 MW interconnection request with NYISO, and this 126 MW request was based on the anticipated capacity that the Project site could likely accommodate (as estimated at the time the request was submitted).

Additionally, §617.9 (b)(5)(v) provides that the description and evaluation of each alternative should be at a level of detail sufficient to permit a comparative assessment of the alternatives discussed. It is well-established law under SEQRA that “the degree of detail with which each alternative must be

discussed will vary with the circumstances and nature of each proposal.” (*King v Saratoga County Bd. of Sup’rs*, 223 AD2d 894 [3d Dept 1996], *aff’d* 89 NY2d 341 [1996]; Impact Review, § 5.14 [3].)

SEQRA requires analysis of the no action alternative, and otherwise prescribes the range of other alternatives that may be evaluated as appropriate to a given action. The no action alternative analysis should evaluate both the adverse and beneficial changes to the Project site that are likely to occur in the reasonably foreseeable future, in the absence of the proposed action. The range of other alternatives may also include, as appropriate, alternative sites, technology, scale or magnitude, design, timing, use and types of actions. Project site alternatives, however, may be limited to parcels owned by, or under option to, a private project sponsor (See SEQRA §617.9[b][5][v]).

The discussion that follows presents the no action alternative, and a range of “reasonable” alternatives as appropriate with regard to the nature of a wind energy project. These alternatives to the proposed action are evaluated in this DEIS in furtherance of a comparative assessment of each alternative explored, and with a focus on those specific environmental impacts identified that have the potential to be significant. Consistent with SEQRA, this DEIS will assess the following alternatives:

- Alternative Project Site
 - Alternative Project Design, including:
 - Preferred Alternative (48 turbines) – The site layout that was selected based upon the maximum MW production based upon the land within the current Project site, site constraints, landowner participation, wind resource assessment, with impacts to environmental resources minimized to the maximum extent practicable.
 - Larger Project Site Alternative (62 turbines) – The site layout that places the maximum number of turbines to achieve a larger MW production in a land area that extends into the Town of Orleans. Additionally, in this alternative, lower turbine heights were evaluated (due to turbine availability during consideration of this alternative). This site layout alternative considers impacts to environmental and aesthetic resources and area residents.
 - Fewer Turbine Alternative (25 turbines) – A layout that focuses on using the Preferred Alternative, and reducing the number of turbines to 50% to evaluate the potential for further reducing impacts to land use, wetlands, forested areas, and area residents.

- Alternative Technologies
- Alternative Construction Phasing
- No Action Alternative

5.2 ALTERNATIVE PROJECT SITE

Under 6 NYCRR § 617.9(b)(5)(v)(g), site alternatives addressed in an EIS may be limited to parcels owned by, or under option to, a private project sponsor. We have discussed Atlantic Wind's other properties which are included in the 62-turbine Project alternative (see analysis below), and Dutch Gap properties (described in Section 8 Cumulative Impacts), Atlantic Wind has obtained interests in other parcels in the region but at this time, on account of isolation, unknown/yet unmeasured wind characteristics, adverse regulatory climate, sensitive site features and other factors these parcels are not sufficiently advanced for consolidation or inclusion in a Project. Accordingly, there is no requirement to evaluate any additional alternative Project areas. Nonetheless, this section provides background information on Atlantic Wind's selection of the Project site to facilitate understanding of the criteria that was employed in choosing a site that would best maximize the capture and utilization of a unique wind resource while recognizing existing siting constraints.

As mentioned above, the selection of a wind project site is constrained by several factors that are essential to the success of a wind energy production facility Site. These factors 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 with sufficient space to minimize impacts on area residences
- compatible land use and zoning and limited environmental/site constraints
- willing land lease participants and host communities

Atlantic Wind began a search within the Jefferson County area for appropriate Project sites that had these characteristics. The analysis of potential sites concluded that many other locations in the region presented significant constraints on wind power development, including incompatible land uses, lack of contiguous land, proximity to population centers, a lack of adequate wind resource, or unsuitable transmission facilities (either too far to connect or in need of major system upgrades).

Atlantic Wind selected the proposed Project site because of the quality of the wind resource, the ease of access to the site, relatively low population density, availability of suitable transmission facilities, and positive feed-back from landowners and town officials. These factors combined to make the proposed site desirable from the standpoint of wind power development. Based upon the result of the site evaluations performed in the region, other potential locations do not have the same combination of desirable features.

5.3 ALTERNATIVE PROJECT DESIGN

5.3.1 *Project Design Process*

To assess project layout alternatives and associated impacts, it is important to first understand project design development. The proposed location and spacing of the wind turbines and support facilities is based upon site constraints, landowner participation, and site-specific design considerations. The steps involved in determining the final location of project components (wind turbines, electrical lines, access roads, O&M facility, and collection station/interconnection substation) generally include:

1. Measure site-specific wind resource patterns and quantities.
2. Obtain substantial volunteer landowner and neighbor agreements.
3. Perform a site constraint analysis.
4. Develop a preliminary turbine layout.
5. Develop a preliminary access road and electrical layout.
6. Perform site specific studies and data collection
7. Minimize impacts to identified constraints; revise layout as required.
8. Review layout changes with participating landowners, revise layout as required.

Once the overall project area was evaluated for initial siting criteria, the Project sponsor installed wind measurement/meteorological towers to collect site-specific data to develop a turbine array design (site layout for individual turbines or strings of turbines). During the array development, the Project sponsor developed voluntary agreements with willing landowners and neighbors that would allow for the construction and operation of all project components including turbines, buried electrical lines, access roads, and the collection substation/switching station. A substantial participation effort on the part of the landowners and neighbors was obtained prior to development of a preliminary site layout.

After landowner participation status was substantially advanced, a site constraint analysis was performed to identify suitable preliminary locations for wind turbines only. Site constraints include, but are not limited to, *wetlands and streams, local law setback requirements to property lines/roads, proximity to non-participating permanent residential structures, microwave paths (Fresnel zones), agricultural land and steep slopes*. Preliminary turbine siting is intended to maximize/optimize wind resource and landowner participation, while avoiding site constraints to the maximum extent practicable.

Based solely upon land area and minimum turbine spacing requirements, a 9,450-acre project area can accommodate up to approximately 70 turbines (assuming 135 acres of land needed per turbine). Through an analysis of site constraints, landowner participation, wind resource assessment, environmental resource factors, and review of the site's zoning constraints, a site development constraint analysis was prepared. Of the 9,450 acres within the Project area, approximately 5,486 acres are owned by participating landowners. Of these 5,486 acres, 3,392 acres are constrained by required zoning setbacks, Fresnel zones, and wetland/waterbody features or other construction related constraints. Approximately 2,094 acres (portions of 39 parcels of land) of the 9,450-acre Project area were determined to have some area of potential development for wind turbine component siting. Essentially, utilizing only those portions of land parcels identified as potentially developable areas, Atlantic Wind prepared a proposed layout of all Project components.

Preliminary siting for other project components including the O&M facility and the collection substation/switching station largely follow the same process. The collection substation/switching station is required to be located on a private land parcel immediately adjacent to the National Grid Lyme Tap (Perch Lake) – Lyme (Rockledge) 115 kV transmission line ultimately delivering the generated power to the New York Grid. Several suitably sized parcels were identified, and ultimately site selection was based upon volunteer landowner willingness and a parcel clear of significant site constraints as mentioned above. Similarly, the O&M facility needs to be centrally located within the project area on private land with a willing landowner, suitable acreage, and relatively void of significant site constraints.

Once a preliminary turbine layout is identified through the constraint analysis and optimization process, access roads and electrical collection lines are defined. The Project sponsor has several engineering criteria required in initial access road and electrical line layout, including designing the alignments to minimize installation/material costs (shortest sections of road and electrical lines possible). After this initial access road and electrical line layout, modifications are made to avoid or minimize impacts to the identified site resources and to meet landowner requirements for individual

siting on private land. Additionally, site modifications are made to minimize impacts including co-locating electrical lines with access roads (where feasible), minimizing new wetland crossings, and using existing farm drives or other level areas for proposed Project access roads. All preliminary layout efforts were reviewed on site with the landowners, Project engineering and environmental consultants, and relevant agency personnel (including the NYSDEC), to minimize impacts to identified site resources and meet landowner requirements.

Based upon this process, several project alternatives were explored. Three project alternatives are described below, along with a comparative assessment of their temporary and permanent impacts and benefits.

5.3.2 Preferred Alternative (48 turbines)

The Preferred Alternative maximizes the benefit derived from the wind and land resources, while minimizing impacts to wetlands, forestland, and wildlife resources. As previously discussed, based solely upon land area and minimum turbine spacing requirements, a 9,450-acre project area can accommodate up to approximately 70 turbines (assuming 135 acres of land needed per turbine). However, based on the project design process (including land easement agreements), the currently defined 9,450-acre Project site will support approximately 48 turbines. The Project sponsor proposes to use a Gamesa G90 or G97 wind turbine, each with a rated capacity of 2.0 MW. This layout is presented in Figures 3 and 14 and is analyzed throughout this DEIS as the proposed "Project".

All of the 48 potential turbine sites are located a minimum of 500 feet from existing roads, and all but one are located at least 1,250 feet from nonparticipating neighboring residential structures. Additionally, all 48 wind turbines are located within the Town's Wind Power Overlay district. In addition to the 48 wind turbines, the Preferred Alternative also consists of 13.6 miles of access roads, 16.1 miles of buried electrical collection lines, 5.5 miles of overhead electrical collection lines, a collector substation/switching station, a permanent met tower, up to three construction staging/laydown areas, a concrete batch plant, and a 6,000 square foot O&M facility.

Impacts

Impacts from the preferred alternative are described in detail in Section 3.0 by resource type. As noted in Section 4 (Unavoidable Adverse Impacts), and in the relevant subsections in Section 3, the majority of the adverse environmental impacts associated with the Project will be localized and temporary, and will result from construction activities. Site preparation (e.g., clearing, grading),

improvement of local roads, and the installation of roads, turbines, electrical interconnects, staging areas, the O&M facility, meteorological tower, and the collection substation/interconnection station will have short-term and localized adverse impacts on the soil, water, agricultural and ecological resources of the site. Construction of the Project will result in total (temporary and permanent) disturbance of up to 467.5 acres of soil and 498.5 acres of vegetation, most of which is in agricultural fields. In addition, approximately 48.5 acres of forest and 5 acres of wetland could be disturbed by Project construction.

Long-term unavoidable impacts associated with operation and maintenance of the Project includes turbine visibility from many locations within the town and surrounding areas. Within 10 miles of the Preferred Alternative Project area, 40% of the land area will experience some visibility of the project (based upon maximum turbine height, considering existing vegetation and topography). The presence of the turbines will result in a change in perceived land use from some areas. The Project also may function to keep land within the Project site in rural and agricultural uses, thus protecting open space and existing land use patterns. Project development will also result in an increased level of sound at some receptor locations (residences) within the study area, although none will exceed the local noise ordinance level of 50 dBA. Based upon the Preferred Alternative layout, the Gamesa G90 will have potential adverse shadow flicker on area residences located in the southwest corner of the Project site and up to 10 houses may experience shadow flicker in excess of 30 hours per year (5 for G90 and 10 for G97 Gamesa models). Additionally, a minor loss of agricultural and forest land, wildlife habitat changes, will occur. The Preferred Alternative will result in the conversion of approximately 49 acres of land to built facilities. A total of approximately 34.5 acres of agricultural land will be converted to non-agricultural use/built facilities (e.g., roads, turbines, substation, etc.), and a total of approximately 3 acres of forest will be converted to built facilities. Permanent wetland impacts are estimated to be approximately 0.5 acres.

Finally, some level of avian and/or bat mortality associated with bird/bat collisions with the turbines will occur as a result of the operation of the Preferred Alternative. Based upon post construction studies conducted between 2006 and 2009 at seven wind farms operating in New York, it is assumed that between 1.1 and 5.81 bird fatalities per megawatt could occur annually. Assuming a 100-megawatt project is developed, between 106 and 558 bird fatalities may occur annually. Based upon the results of these same post construction studies, between 0.46 and 15.0 bat fatalities per megawatt may occur. Assuming a 100-megawatt project is developed, between 44 and 1,407 bat fatalities may occur annually. (Jain et al. 2007, Jain et al. 2008, Jain et al. 2009a, Jain et al. 2009b, Jain et al. 2009c, Jain et al. 2010a, Jain et al. 2010b, Stantec 2009, and Stantec 2010).

Benefits

The Preferred Alternative will deliver up to 96 MW of electrical power to the New York state grid without generating emissions from operation. Total net generation delivered to National Grid's existing 115 kV line is expected to be approximately 252,290 MWh, or enough electricity to meet the average annual consumption of between approximately 22,500 and 35,000 average NYS households (based on average annual electric consumption of 7.2 MWh for New York and 11.2 MWh for the U.S.; Energy Information Administration [EIA], 2009). The Project is expected to generate approximately \$768,000 per year (more than \$15 million over the life of the contract) in PILOT revenues to local taxing jurisdictions, while requiring very little in terms of municipal services. The Preferred Alternative will maximize the opportunity to assist the State in meeting State policy objectives (including the State Energy Plan, Renewable Portfolio Standard targets and other Executive Orders) while minimizing potential environmental impacts and impacts of local concern typically associated with wind-powered electric generating facility siting, including visual and noise impacts, and development in New York State. In addition, the benefits of the preferred alternative include positive impacts on air quality (through reduction of emissions from fossil-fuel-burning power plants), and climate (reduction of greenhouse gases that contribute to global warming). These project benefits are discussed in more detail in Section 2.0.

5.3.3 Larger Project Site Alternative (62 turbines)

A Larger Project Site Alternative was considered and places a larger number of turbines in a larger project area that extends into the Town of Orleans. In this alternative, 62-2.1 MW wind turbines would be sited within an expanded project area of approximately 11,800 acres resulting in a project that can generate approximately 130 MW³. This Alternative would include 54 turbines in the Town of Clayton and 8 turbines in the Town of Orleans, as depicted in Figure 15. Under this alternative, a slightly shorter turbine was considered with an overall foundation to blade tip height of 407 feet (based upon 2007 turbine availability). Two permanent meteorological towers would also be installed, along with an O&M Facility, a system of gravel access road, buried electrical lines (electrical interconnect), and an interconnection substation adjacent to the existing National Grid Lyme Tap (Perch Lake) – Lyme (Rockledge) 115 kV transmission line. All of the potential turbine sites associated with this alternative are located a minimum of 500 feet from existing roads and at least 1,250 feet from nonparticipating neighboring residential structures, and are all located within the Wind Power Overlay districts of Clayton and Orleans.

³ The Larger Project Site Alternative is the project as proposed in the Draft Generic Environmental Impact Statement accepted as complete by the Town of Clayton in February 2007.

Impacts

Impacts from the Larger Project Site Alternative are similar in nature to the Preferred Alternative. However, because of the shorter turbine, impact assumptions (e.g. anticipated areas of disturbance per component) may be somewhat reduced. Under this alternative, temporary construction activities will result in total (temporary and permanent) disturbance of up to 330 acres of soil and 399 acres of vegetation, most of which is in agricultural fields. In addition, approximately 33 acres of forest and less than one acre of wetland (including one state regulated wetlands) could be disturbed by Project construction. However, most of this disturbance will be temporary.

As with the Preferred Alternative, operation of the Larger Project Site Alternative will result in a minor loss of agricultural and forestland, wildlife habitat changes, will occur. This alternative will result in the conversion of approximately 56 acres of land to built facilities. A total of approximately 42 acres of agricultural land will be converted to non-agricultural use/built facilities (e.g., roads, turbines, substation, etc.), and a total of approximately 4 acres of forest will be converted to built facilities. Permanent wetland impacts are estimated to be approximately 1.8 acres.

The operation of this alternative is also expected to result in a proportionately higher level of avian and bat collision mortality as the Preferred Alternative. Assuming that between 1.1 and 5.81 bird fatalities per megawatt could occur annually (based upon the above referenced post construction fatality surveys), the 130 MW project would result between 143 and 755 bird fatalities annually. Based upon the results of these same post construction studies, between 0.46 and 15.0 bat fatalities per megawatt may occur. Therefore Larger Project Alternative would result in between 60 and 1,950 bat fatalities may occur annually.

The turbines in this alternative will be visible from many locations within the surrounding area, but will also be fully or partially screened from viewers in many locations. Within 10 miles of the Preferred Alternative Project area, 60% of the land area will experience some visibility of the project (based upon maximum turbine height, considering existing vegetation and topography). Only 4 receptors have the potential to experience over 30 hours of shadow flicker annually, and turbine-related sound is not predicted to exceed 50 decibels at adjacent residences.

Benefits

The Preferred Alternative will deliver up to 130 MW of electrical power to the New York state grid without generating emissions from operation. Total net generation delivered to National Grid's existing 115 kV line is expected to be approximately 341,640 MWh, or enough electricity to meet the average annual consumption of between approximately 30,500 and 47,450 average NYS

households (based on average annual electric consumption of 7.2 MWh for New York and 11.2 MWh for the U.S.; Energy Information Administration [EIA], 2009). This alternative would be expected to generate approximately \$1 million per year (more than \$20 million over the life of the contract) in PILOT revenues to local taxing jurisdictions, while requiring very little in terms of municipal services.

5.3.4 Fewer Turbines Alternative (25 turbines)

The Fewer Turbines Alternative was designed to maximize the benefit derived from the project, while minimizing impacts associated with shadow flicker on area residents, and to sensitive habitats (specifically to forestland and wetlands). This alternative would involve the construction of 25-2.0 MW wind turbines, with a total installed capacity of 50 MW. The wind turbines for this layout were selected based upon the current locations of the existing Preferred Alternative, but removing turbines that 1) contribute to potentially adverse shadow flicker impacts (over 30 hours annually at nearby residences); 2) have wetlands within their workspace; 3) are located within forested areas; 4) do not comply with local set back requirements; and 5) are located outside of the designated Wind Power Overlay district in the Town of Clayton.

Impacts from the preferred alternative are similar in nature to the Preferred and the Larger Project Site Alternatives as the majority of the adverse environmental impacts associated with the Project will be localized and temporary, and will result from construction activities. It is assumed that construction of the Fewer Turbines Alternative will result in approximately 50% of the anticipated impacts as described for the Preferred Alternative, and are anticipated to result in total (temporary and permanent) disturbance of up to 239 acres of soil and 257 acres of vegetation, most of which is in agricultural fields. In addition, approximately 25 acres of forest and 2 acres of wetland could be disturbed by Project construction.

Long-term unavoidable impacts associated with operation and maintenance of the Fewer Turbines Alternative include turbine visibility from many locations within the town and surrounding areas, but to a lesser degree. Within 10 miles of the Preferred Alternative Project area, 44% of the land area will experience some visibility of the project (based upon maximum turbine height, considering existing vegetation and topography) (only a 3% reduction from the Preferred Alternative). Development of this alternative will also result in an increased level of sound at some receptor locations (residences) within the study area, although, like the other alternatives, none will exceed the local noise ordinance level of 50 dBA. Due to selective turbine eliminations conducted as a part of this alternative, no residences will experience shadow flicker in excess of 30 hours per year.

Additionally, a minor loss of agricultural and forest land, wildlife habitat changes, will occur as a result of the operation of the Fewer Turbines Alternative. For example, there will be a conversion of approximately 25 acres of land to built facilities, including approximately 18 acres of agricultural land and less than 1 acre of forestland. Permanent wetland impacts are estimated to be less than 1/3 acres, as all wetlands in turbine workspaces are eliminated under this alternative.

The operation of this alternative is also expected to result in a proportionately lower level of avian and bat collision mortality than the Preferred Alternative. Assuming that between 1.1 and 5.81 bird fatalities per megawatt could occur annually (based upon the above referenced post construction fatality surveys), the 50 MW project would result between 55 and 291 bird fatalities annually. Based upon the results of these same post construction studies, between 0.46 and 15.0 bat fatalities per megawatt may occur. Therefore, the Fewer Turbine Alternative would result in between 23 and 750 bat fatalities may occur annually.

Benefits

The Fewer Turbine Alternative will deliver up to 50 MW of electrical power to the New York state grid without generating emissions from operation. Total net generation delivered to National Grid's existing 115 kV line is expected to be approximately 131,400 MWh, or enough electricity to meet the average annual consumption of between approximately 11,700 and 18,250 average NYS households (based on average annual electric consumption of 7.2 MWh for New York and 11.2 MWh for the U.S.; Energy Information Administration [EIA], 2009). The Project is expected to generate approximately \$400,000 per year (approximately \$8 million over the life of the contract) in PILOT revenues to local taxing jurisdictions, while requiring very little in terms of municipal services.

5.3.5 Comparison of Alternative Project Layouts and Determination

The three alternatives result in a similar type of temporary construction related, and permanent operating related impacts. For many resources, impacts are only incrementally larger or smaller when comparing the three alternatives side-by-side, while with others, impacts are eliminated or significantly reduced. Table 31 provides a direct comparison between various comparison criteria (project components, impacts, and benefits).

Table 31. Comparison of Alternative Project Layouts Based Upon Select Comparison Criteria

Comparison Criteria	Preferred Alternative (48 Turbines)	Larger Project Site Alternative (62 Turbines)	Fewer Turbine Alternative (25 Turbines)
Proposed Turbine and MW Output	Gamesa 2.0 MW (G90 or G97)	Siemens 2.1 MW	Gamesa 2.0 MW (G90 or G97)
Maximum Rated Output	96 MW	130 MW	50 MW
Maximum Turbine Height (Feet)	476	406	476
Project Area (Acres)	9,450	11,800	6,767
Access Road Length (Miles)	13.6	16	7
Electrical Lines Length (Miles)	21.6	28	12
Number of Wind Measurement Towers	1	2	1
Total Soil Disturbance (Acres)	467.5	330	239
Temporary Vegetation Clearing (Acres)	404.5	399	257
Permanent Soil Disturbance (Acres)	48.5	56	25
Permanent Conversion of Forestland (Acres)	3	4	<1
Permanent Conversion of Agricultural Land (Acres)	34.5	41	18
Permanent Wetland Loss (Acres)	<1	<2	<1
% of Visibility in 10 mile viewshed ¹	47	40	44
Number of Receptors with Shadow Flicker Hours over 30 Annually ²	5-10	4	0
Number of Receptors with Noise Levels Exceeding Local Ordinance Limits	0	0	0
Potential Annual Bird Mortality Range	106 to 558	143 to 755	55 to 291
Potential Annual Bat Mortality Range	44 to 1,407	60 to 1,950	23 to 750
Projected Annual PILOT Payments	\$768,000	\$1,040,000	\$400,000
Projected Number of Homes Powered by Project	22,500 – 35,000	30,500 – 47,500	11,700 – 18,200

Notes:

- 1 Based upon maximum turbine height and considering the effects of topography and vegetation in the 10-mile viewshed.
- 2 Under the Preferred Alternative, two turbine types and sizes are considered; therefore the resulting range is given.

The impacts of concern for the Project are as indicated in Table 31, and are associated with potential mortality to avian and bat resources, potential project visibility, noise impacts, shadow flicker impacts, and impacts to forest land, agricultural land and wetlands. As can be seen from the analysis above, as a general matter, the impacts associated with three alternatives are not significantly different, while the benefits that result from each alternative do vary more dramatically.

Given this circumstance, it might be concluded that the Larger Project Site Alternative could be the preferable option because it best utilizes the wind resource in the Project area and produces the greatest benefits, without significantly increasing impacts, as compared to the other alternatives. Unfortunately, this option would require use of properties that the Project sponsor has leased in the Town of Orleans. Recently the Town of Orleans Town Board has expressed strong opposition to wind development, indicating that it would be adopting legislation aimed at prohibiting development in the Town. Because of this regulatory uncertainty regarding wind project development in the Town of Orleans the larger project (62 turbine) alternative, it is not a feasible alternative at this time.

As is clear from the analysis above, the Fewer Turbine Alternative (25 turbine) project would provide only incremental reductions in Project impacts. It is not anticipated that there will be an appreciable visual difference between having 25 or 48 turbines. However a decrease in the number of turbines by nearly 50% from the Preferred Alternative would generally cut in half the Project benefits including its contribution to NY's policy goals, delivery of clean, "home grown" renewable energy, PILOT payments and landowner royalties. As such, the 25-turbine alternative does not significantly reduce impacts sufficient to warrant the significant reduction in Project benefits.

5.4 ALTERNATIVE TECHNOLOGIES

The turbines proposed for the Project will utilize the latest in wind power generation technology to enhance Project efficiency and safety and minimize impacts such as noise. The Applicant is proposing to develop 96 MW of renewable energy. Alternative power generation technologies, such as fossil-fuel and biomass combustion, would not meet the goals of the Project, are not the area of expertise of the Project sponsor, and would pose more significant adverse environmental impacts, particularly on air quality but also on land use and water resources. Most fossil fuel-fired generating facilities would require significant amounts of water to operate, the use of which may pose impacts to surface water or groundwater resources as well as fish and other aquatic organisms. Conventional power plants also would not advance the RPS goal of generating 25% of the state's power by 2013. According to the NYS Renewable Portfolio Standard 2008 Performance Report, renewable energy production only reached 25% of its annual target in 2007 although it is projected to reach 75% of the 2008 main tier target (NYSERDA, 2008). Approval of projects such as the Horse Creek Wind Farm project is needed in order to help meet New York State's RPS goals.

In regard to other renewable sources of generation, hydroelectric plants have significant impacts on terrestrial and aquatic ecological resources, land use, and aesthetics. Like wind power projects they

are also resource dependent, and can also only be developed in places with appropriate water volumes and topographic conditions (which do not exist within the Project site). Other renewable energy technologies, such as solar power and hydrogen, are still either cost-prohibitive or in development. Aside from cost constraints, utility-scale solar power may not be feasible in an area such as upstate New York, where available sunshine is limited. Currently, wind is the only renewable energy source that can help meet energy needs in a technologically and economically efficient manner. It can also do this without the emission of greenhouse gases and other environmental impacts that alternative power generation technologies would create.

5.5 ALTERNATIVE CONSTRUCTION PHASING

Atlantic Wind proposes to construct the Project in a single phase during a single construction season. Single phase construction will result in a more efficient construction process, with a shorter duration of construction-related impacts, than a multiple phase construction approach, and will allow resources, such as soils, wildlife, and vegetation, that are temporarily impacted by construction, to begin to recover and/or habituate sooner. In contrast, a multiple phase construction process would result in a longer period of construction disturbance, and would be less economically efficient for both Atlantic Wind and the local beneficiaries of the direct and indirect economic benefits of the Project.

5.6 NO ACTION

The no action alternative assumes that the Project site would continue to exist as rural, active agricultural land, residential property, and vacant/underdeveloped land. This no action alternative would not affect ambient noise conditions, traffic or public road conditions, wildlife or wildlife habitat, 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. If the Project were not built, the State would lose the opportunity for adding a significant source of clean, renewable energy to New York State's energy mix that would lessen the State's dependence on imported fossil fuels. There would also be a lost opportunity to reduce emissions of greenhouse gases, SO₂ and NO_x as discussed in Sections 2 and 3.4 of this DEIS. Finally, the no action alternative would be contrary to the State's goals in the RPS program, since the Project represents one of the best wind resources remaining to be developed in New York State.

In addition, no economic benefits would accrue to the area. These unrealized economic benefits would include loss of approximately 150 construction and up to 11 permanent jobs, lease payments to the landowners, and annual PILOT payments to the affected towns, school districts, and county. Annual revenues to the Town of Clayton, Jefferson County, and the area school districts remain to be negotiated in the final terms of a PILOT agreement, but are anticipated to be in the range of \$768,000 per year. Under the no action alternative, multiplier effects from these economic benefits would also not be realized (as described in Section 3.9). In addition, to the extent that the Project helps supplement farm income and keeps land in active agricultural use, the no action alternative could have an adverse impact on land use and grassland bird habitat. As family farms go out of business, the land is incorporated into larger corporate farming operations, converted to residential use, or allowed to revert to successional communities. All of these possibilities would result in a change to the existing character and available wildlife habitat.

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 benefits that the Project would generate, the no action alternative is not a reasonable alternative.

6.0 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

The proposed Project will require the irreversible and irretrievable commitment of certain human, material, environmental, and financial resources, as described below. For the most part, the commitments of these resources will be offset by the benefits that will result from implementation of the Project.

Human and financial resources have already been and will continue to be expended by Atlantic Wind, the State of New York (i.e., various state agencies), Jefferson County, and the Town of Clayton for the planning and review of the Project. The expenditure of funds and human resources will continue to be required throughout the permitting and construction phases of the Project (e.g., for environmental reviews and permitting, site plan approval, building and construction inspections). However, these commitments are appropriate and justifiable in light of the financial and energy-related benefits that would be derived from the Project.

The Project also represents a commitment of land for the life of the Project. Specifically, the approximately 48.5 acres of land to be developed for wind turbines, access roads, and substations will not be available for alternative purposes for the life of the Project. However, because the turbines/towers could be decommissioned, and the land reclaimed for alternative uses at some future date, the long-term commitment of this land to the Project is not either irreversible or irretrievable.

Various types of construction materials and building supplies will be committed to the Project. The use of these materials, such as gravel, concrete, steel, etc., will represent a long-term commitment of these resources, and potentially limit their availability for other future projects. However, the volume of materials used for the Project would represent a very small percentage of these materials produced/manufactured on a regional, national or worldwide basis. Moreover, some of these materials such as stone and steel will be available for salvage, reclamation and recycling; a small percentage upon completion of construction, and the remainder once the Project is decommissioned. Therefore, it is anticipated that the Project will not have a significant impact on the availability of these construction materials.

Energy resources also will be irretrievably committed to the Project, during both the construction and operation of the Project. Fuel, lubricants, and electricity will be required during site preparation and turbine construction activities for the operation of various types of construction equipment and

vehicles, and for the transportation of workers and materials to the Project site. However, the energy resources utilized to construct and operate the Project will be significantly offset by the benefits of up to 96 MW of clean, renewable energy generated by the Project and made available to the people of New York State.

7.0 GROWTH INDUCING IMPACTS

Certain proposed actions covered under the SEQRA process have the potential to trigger further development by either attracting a significant local population, inviting commercial or industrial growth, or by inducing the development of similar projects adjacent to the built facility. The proposed Project does not require a permanent work force greater than approximately eight to eleven employees, and therefore will not lead to significant growth in local population or housing. Although the Project will provide some support to the local economy through the purchase of goods and services (primarily during construction) the type and level of expenditures are not of the sort that would generate significant growth of businesses that serve the proposed facility. Therefore, Project-related secondary/indirect impacts are not anticipated to influence local growth patterns. The lower taxes and increased tax base that would result from the Project has the potential to provide some incentive for businesses and residents to locate in the Town, but the impact is expected to be minimal.

The Project is proposed, in part, because of the presence of existing resources and facilities that allow the Project to be economically viable. Specifically, the availability of adequate wind resources and the presence of an existing transmission line allows for generation and transmission of the Project's electric output to the State's power grid. The occurrence of these resources/facilities might suggest that other wind power projects could be proposed on adjacent lands. However, this would be the case with or without the proposed Project. The Project's presence alone is not anticipated to encourage the development of additional wind power projects in the area. In fact, addition of the proposed Project will meet the capacity of the existing transmission facilities and, therefore, the Project will likely make future wind projects more difficult to develop as such development could only be accommodated by upgrading the existing transmission line. Such upgrades would likely make future wind projects less economically viable. In addition, landowner willingness and environmental sensitivity play a significant role in the location of wind power projects. As currently proposed, the Project maximizes the land resource within the wind power overlay district of willing landowners within the Town of Clayton. Any additional wind power development in these areas is likely to be limited due to set-back constraints, more significant environmental impacts, and lack of landowner participation.

8.0 CUMULATIVE IMPACTS

SEQRA requires a discussion of cumulative impacts where such impacts are “applicable and significant” (6 NYCRR § 617.9[b][5][iii][a]). Cumulative impacts are two or more individual environmental effects which, when taken together, are significant or which compound or increase other environmental effects. The individual effects may be effects resulting from a single project or, in certain circumstances, from separate projects.

Where individual effects of the Project may interact with other effects of the Project, such potential cumulative impacts have been addressed in Section 3.

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 under common ownership or control. The subsections below provide a broader analysis than is strictly required by SEQRA. These subsections identify other projects, which are not owned by the Applicant, are not part of a common plan but which are proposed for construction in the Region and assess the extent to which the impacts of such projects may be cumulative with the impacts of the Project.

8.1 EXISTING PROJECTS

There are currently no operating utility-scale wind power projects in Jefferson County. The nearest existing project is the Maple Ridge Wind Farm, a 195 turbine, 320 MW wind energy facility located in the towns of Lowville, Martinsburg, and Harrisburg in Lewis County. This facility, in operation since 2006, is located approximately 25 miles from the Project site, and therefore does not have an impact on the Project site or the surrounding area within and near the Town of Clayton.

No other existing projects occur within the Town of Clayton or surrounding area that have environmental effects that would interact with potential adverse impacts identified for the Project.

8.2 PROPOSED OR FUTURE PROJECTS

Within Jefferson County and across New York State, several additional wind-powered generating facilities are in the project planning and development phases. The review and approval status of these projects is highly variable, ranging from preliminary site investigations to those with completed

system reliability impact studies (requirement of the New York Independent System Operator [NYISO]), detailed project plans, and landowner agreements.

The NYSIO 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 New York power grid via 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 this cumulative impact analysis.

In Jefferson County, four additional projects are considered proposed projects that may fall into this category (NYISO, queue accessed 1/19/2011). These include the following:

- St. Lawrence Wind Farm (79.5MW) proposed by AES –Acciona Energy NY, LLC.
- Cape Vincent (210MW) proposed by BP Alternative Energy NA, Inc.
- Dutch Gap Wind (250MW) proposed by PPM Energy, Inc.
- Hounsfeld Wind (268.8MW) proposed by Wind Development Contract Co, LLC.

It is important to note that the assumption that all of these projects would ultimately become operational is dependent on a number of factors, which include completing the NYISO review; completing SEQRA review; completing state, federal, and local permitting; and securing adequate financing for turbine purchase and project construction. Regarding the last point, it is being widely reported (including in the January 2009 edition of *North American Windpower* magazine) that wind energy development companies across the U.S. and New York State are having more difficulty acquiring the necessary funding for their projects (Del Franco, 2009). Wind energy developments require high upfront capital investment in order to construct the projects, and the recent credit crisis has led to some developers being unable to obtain the necessary funding because the cost of capital is rising and access to credit is more difficult.

Any, or all of the proposed projects may not be approved and/or constructed, and therefore would not contribute to cumulative impacts associated with the construction and operation of the Project. Nonetheless, for purposes of this DEIS, it is assumed that all of the proposed projects will be approved and constructed, and provides the analysis which follows of potential cumulative impacts to the extent ascertainable. Only limited information about these projects is available, so only a limited analysis is possible.

The applicant for St. Lawrence Wind established an informational website at www.stlawrencewind.com. Review of this website indicates the project is located in the Town of Cape Vincent along the St. Lawrence River approximately 10 miles west of the proposed Project, as illustrated in Figure 17. The website also contains SEQRA as well as Federal and State wetland permitting documentation. As indicated on the website the project proposes the construction of 51 turbines.

The NYSDEC is the Lead Agency for the Hounsfield Wind Farm project and has posted information and documents related to the project on their website (<http://www.dec.ny.gov/permits/54687.html>). Review of these documents indicates that the project is located on Galloo Island in the Town of Hounsfield and is approximately 19 miles from the proposed Project (See Figure 17). As indicated on the website the project proposes the construction of 82 turbines.

The applicant for the Dutch Gap Wind Farm is PPM Energy, Inc. (Atlantic Wind LLC), now known as a subsidiary of Iberdrola Renewables. According to Iberdrola Renewables, at the time of the interconnection queue request, the Dutch Gap Wind project was envisioned to be an up to 250 MW project consisting of up to 125 wind turbines located in the Town of Orleans and other surrounding communities (located substantially east of the Project) (Burke, pers. comm.). However, at this time, the Dutch Gap Wind Farm project has not been conceived or planned, and no wind measurement data has been collected at any location within the potential future project area. A portion of the Dutch Gap Wind Farm was contemplated in the Town of Orleans, and the current zoning does not allow for wind measurement towers outside of their overlay district (which currently is only a small portion of the town). Without sufficient wind measurement data, the Project sponsor is uncertain of the viability of a project (Burke, pers. comm.). In addition, without an overlay expansion, the town would be unable to host a project. Zoning is currently being reviewed by town, planning and zoning board and restrictive zoning related to wind is anticipated. Therefore, the Project sponsor has determined this potential future project is on hold. Additionally, although the current interconnection request is for 250MW, it is understood that interconnection constraints/congestion would limit the future project

size as well. Further studies will be required to determine what size project could be conceivable. As a result of this uncertainty about the project, it is not further addressed for cumulative impacts with the current Project. In the event that this Project should go forward it would be subject to a full environmental impact review which would include, as appropriate, a cumulative impact analysis.

The consultant for the Cape Vincent Wind Farm established an informational website at <http://www.erm.com/Public-Information-Sites1/New-York-Wind-Projects/Cape-Vincent-Wind-Power-Project/>. Review of this website indicates the project is located to the south of the St. Lawrence Wind project. This project is approximately 10 miles west of the Project and consists of approximately 140 turbines (See Figure 17). The website contains additional SEQRA documentation for the Cape Vincent Wind Farm.

8.3 POTENTIAL CUMULATIVE EFFECTS

Given the separation distance of the above referenced projects, the possibility of these Projects having cumulative impacts to area residences from noise or shadow flicker is extremely remote as the turbines would not overlap or be interspersed with proposed Horse Creek turbines (i.e. be located within 0.5 mile of each other). Additionally, given the distance separating the projects, cumulative impacts to wetlands, streams, subsurface archeological resources, and soil/topography are not anticipated. Impacts to these resources as a result of the construction or operation of the Project will be localized, and largely temporary. Similarly, impacts to these resources at the project sites of the Hounsfield, St. Lawrence, and Cape Vincent wind power projects are anticipated to be localized to those project sites.

The occurrence of the projects in separate municipal jurisdictions makes impacts/benefits to local socioeconomic resources unlikely, in addition to community facilities and local zoning. However, potential cumulative impacts could include construction-related impacts to ports on Lake Ontario or St. Lawrence River (if offshore delivery is made) and to area roads and bridges. This would only occur if two or more projects were constructed simultaneously and if they used the same delivery ports and construction delivery routes. Should this situation arise, any cumulative impacts would be temporary and short-term in nature. Upon issuance of approvals of individual projects, coordination of transportation routes would be undertaken by the involved project developers to assure that the duration and extent of impact is minimized and that road repair/restoration work is accomplished at the appropriate time, and at no cost to the affected jurisdictions.

Other potential resource areas that may experience cumulative impacts include visual/aesthetic resource, and avian and bat populations. The potential cumulative impact of the construction and operation of the Project upon these resources, in consideration of the Hounsfield, Cape Vincent, and St. Lawrence Wind projects, are discussed further, below.

8.3.1 *Potential Cumulative Effects to Visual/Aesthetic Resources*

A possible cumulative impact resulting from the construction and operation of multiple proposed wind power projects within the county would be the effects on visual/aesthetic resources and community character. The cumulative impact of multiple projects will be highly variable depending upon the number of turbines visible, their proximity to the viewer, the landscape setting, and the viewer's attitude toward wind power. If multiple projects were visible from a particular viewpoint, the typical scenario would have portions of one project being visible in the foreground while another is visible in the background. Although a project may be visible from many miles away, its visual impact diminishes significantly at distances over 3.5 miles (Eyre, 1995). In addition, long distance views across Jefferson County are highly variable and often screened by built structures, topography and forest vegetation. Consequently, visibility of multiple projects (if they are ultimately built) would generally be restricted to elevated, open (agricultural) areas, where residential density is generally lower (as opposed to villages and hamlets which are often located in valley setting and have limited outward views to the landscape due to the presence of building and trees).

The western portion of the visual study area for the Project is also within the 10-mile-radius areas around both the proposed Cape Vincent and Saint Lawrence projects. Visually sensitive sites within this area include the Village of Chaumont, Chaumont Bay, Long Point State Park (on Point Peninsula), portions of the Saint Lawrence River shoreline, and portions of the Great Lakes Seaway Trail National Scenic Byway. There are likely numerous areas located west of the Project where turbines from the Horse Creek Project and turbines from one or both of the other proposed projects are visible. From on-shore locations in the western portion of the study area (including the Great Lakes Seaway Trail National Scenic Byway), the Horse Creek Project would be located east/eastward of a potential viewer while the other projects would be located to the west or westward of the viewer. In general, direct views of the Horse Creek Project from landward areas west of the Project will not include turbines from the other proposed projects. In these areas, turbines from the Horse Creek and other two proposed Projects would be located in opposite directions or at oblique angles from the viewer.

Views from offshore areas within the western part of the visual study area (including areas within the Saint Lawrence River and Lake Ontario) will likely include turbines from multiple projects. In all cases where turbines from multiple projects are visible, turbines from the Cape Vincent, Saint Lawrence, and/or Hounsfield projects would be significantly closer to the viewer than turbines from the Horse Creek Project. In these views, the turbines from the proposed Horse Creek Project would be visible in the distant background and in some cases could be screened by turbines from the other projects located nearer to the viewer.

Areas located east of the proposed Project are unlikely to incur significant cumulative visual impacts in the event that more than one of the presently proposed wind projects in the region is constructed. From areas east of the Project where turbines from the proposed Project are visible, the proposed Cape Vincent and Saint Lawrence projects would be located at least 10 miles further away (than the proposed Project) from the viewer (to the west). Although it is possible that some westward views of the Horse Creek Project could also include turbines from these other two projects in the distant background (i.e., minimally at distances of 10 miles greater than the proposed Horse Creek turbines in any given view), the addition of these more distant turbines is unlikely to result in significant additional impacts. Turbines from the proposed Hounsfield project are located at even greater distances, and if visible from any specific vantage point they would be minor elements in the distant background of the view.

Cumulative visual impacts were also considered in analyses conducted for the other proposed projects in the county. The proposed Cape Vincent and Saint Lawrence projects are located immediately adjacent to one another on contiguous land parcels. Analyses conducted for both of these projects included a visual resource evaluation of a 5-mile-radius area around each project (ACPNY, 2009; ERM, 2007; Tetra-Tech, 2007). Regarding cumulative impacts, the analysis concluded for the Cape Vincent project concluded that the cumulative effect of the two projects was essentially the same as if either project were doubled in size, and “to simply broaden the geographic range which will be subject to being within the boundary of a large wind power project, and to increase the number of turbines seen within those project boundaries” (ERM, 2007: 169). The analysis conducted for the Saint Lawrence project concluded that the cumulative impact from multiple projects “will be highly variable depending upon the number of turbines visible, their proximity to the viewer, the landscape setting and the viewer’s opinion regarding renewable energy” (Tetra-Tech, 2007: 4-2). The analysis for the Hounsfield project concluded that no cumulative visual impacts were expected because the viewshed for the Hounsfield project did not overlap with the viewsheds from the other proposed projects (ACPNY, 2009: 6-30).

Because of the relative proximity of the other proposed wind energy projects in Jefferson County, there are some locations within the visual study area for the Horse Creek Project from which turbines associated with multiple wind energy projects could potentially be visible. In all cases, the turbines from the Horse Creek Project and the other projects will be located either in opposite directions, at oblique angles to the viewer, or in the distant background if included in the same direct view.

8.3.2 *Potential Cumulative Effects to Avian and Bat Populations*

Cumulative impacts to avian and bat populations can be understood by assessing publicly available existing study results from nearby projects, including the proposed Hounsfield Wind Farm, the Cape Vincent Wind Farm, and the St. Lawrence Wind Farm. Each of these wind farms undertook preconstruction surveys similar in scope and duration to the Project, including breeding bird surveys, migratory bird surveys, raptor and/or waterfowl surveys, bat acoustic surveys, and bat mist net surveys. Additional information can also be derived from wind farms operating in New York and their associated post construction surveys.

With some notable exceptions, similar avian species were observed at the other project locations, and species composition was dependent upon proximity to the lakeshore and vegetative community diversity and composition. A summary of avian studies conducted for the Hounsfield Wind Farm, the Cape Vincent Wind Farm, and the St. Lawrence Wind Farm are presented in the Cumulative Impacts section of the Hounsfield DEIS (<http://www.dec.ny.gov/permits/54687.html>). The Hounsfield DEIS Cumulative Impact Assessment provides the following descriptions of potential avian impacts by project:

Table 32. Description of Potential Impacts Avian Impacts by Planned Jefferson County Projects¹

	Hounsfield Wind	St. Lawrence Wind	Cape Vincent Wind	Horse Creek Wind
Breeding Birds	Displacement risk to Eastern Meadowlark, Upland Sandpiper, Northern Harrier and Bobolink. Collision risk to Eastern Kingbird, Red-tailed Hawk, Northern Harrier and Upland Sandpiper.	Impacts are not expected to be significant and are expected to be evenly distributed among species commonly seen.	Impacts expected to be even distributed among gulls, Canada goose, turkey vulture and American crow.	Displacement risk to Eastern Meadowlark, Bobolink, Northern Harrier, Upland Sandpiper, Horned Lark, and Grasshopper Sparrow, dependent upon turbine location.
Raptors	Collision risk larger in winter than inland sites in New York, particularly to Rough-legged Hawk and Bald Eagle, depending upon vole cycle on island.	Increased collision risk for Rough-legged and Red-tailed Hawks, however impacts are not expected to be significant.	Raptors in general did not have a high exposure indices due to low numbers recorded. Turkey vultures had a high exposure risk. Increased collision risk for Rough-legged and Red-tailed Hawks, but low impacts expected.	Migratory bird and raptor fatalities will probably be small and limited to Red-tailed Hawk and American Kestrel.
Waterfowl	Collision risk for waterfowl low on island due to small numbers of waterfowl activity that cross the island.	Increased risk to Canada goose, but not significant due to large numbers of species in the region.	Increased risk to Canada goose, but not significant due to regionally large population.	Waterbird habitat is sparse in the vicinity of the project area. Displacement impacts to Snow and Canada goose are not likely to be significant.

Notes:

¹Characterizations derived from the Cumulative Impact section in the Hounsfield Draft Environmental Impact Statement accepted as complete by NYSDEC and incorporated into the Final Environmental Impact Statement prepared by NYSDEC.

Some cumulative impacts, such as displacement or collision may occur, regardless of the distance between the subject proposed facilities. Based upon the summary of potential impacts presented in Table 32, above, some cumulative impacts may occur in the form of displacement to species such as Eastern Meadowlark, Upland Sandpiper, Northern Harrier and Bobolink. There is also a common collision risk to Canada Goose among each project, but overall risk to the species is considered low due to a regionally large population.

Based upon a comprehensive analysis conducted for other operating wind projects across the United States, avian collision with wind turbines is estimated to range from 0 to 14 fatalities per MW per year (NWCC, 2010). Based upon post construction studies conducted between 2006 and 2009 at seven wind farms operating in New York, it is assumed that between 1.1 and 5.81 bird fatalities per megawatt could occur annually (Jain et al. 2007, Jain et al. 2008, Jain et al. 2009a, Jain et al.

2009b, Jain et al. 2009c, Jain et al. 2010a, Jain et al. 2010b, Stantec 2009, and Stantec 2010). Applying this range of impacts to the proposed wind energy facilities discussed above, the 654 total MWs of the combined projects could result in an estimated range of 720 to 3,800 cumulative avian fatalities per year for the four projects. While this number may sound large, it is a tiny fraction of the population that migrates through or resides in this area.

In addition, this range is substantially lower compared to other sources of bird mortality. On a national scale, the annual bird mortality associated with wind energy facilities is slight compared to other sources of mortality, such as vehicles (60 million or more deaths per year), building windows (97 to 976 million deaths per year), power and transmission lines (conservatively tens of thousands deaths per year, possibly closer to 174 million deaths per year), communication towers (conservatively 4 to 5 million deaths per year, possibly closer to 40 to 50 million deaths per year), electrocution (estimated tens of thousands per year), pesticides (at least 72 million deaths annually, likely far more), oil spills (hundreds of thousands of deaths per year), oil and wastewater pits (up to two million deaths per year), cats (hundreds of millions of deaths per year), agricultural practices (i.e., hay mowing, pesticides; at least 72 million), and hunting (up to 120 million) (Gill, 1995; Erickson *et al.*, 2001; USFWS, 2002, Ecology and Environment, 2009). A recent National Research Council study concluded that current wind energy generation in the United States is responsible for only 0.003% of anthropogenic avian mortality (NRC, 2007).

Cumulative impacts to bats may also occur as a result of the wind projects in this county, regardless of the distance between proposed facilities. Bat migration, acoustic and mistnetting studies were conducted at each of the Hounsfield Wind Farm, Cape Vincent Wind Farm, and St. Lawrence Wind Farm projects (American Consulting Professionals of New York, 2009). According to the Hounsfield DEIS, the majority of calls observed in each of the projects' acoustic studies were from *Myotis* sp., including Big Brown Bat, in addition to Silver-Haired Bats, and Hoary Bats. Acoustic studies at the Cape Vincent and St. Lawrence Wind project sites also reported calls from Indiana Bat. Indiana Bats were also captured in mistnetting efforts conducted at Horse Creek (see additional detail in Section 3.3). No Indiana Bats were observed at the Hounsfield Wind Farm. In recent years it has become evident that impacts to bats may actually be more of a concern than potential impacts to avian species (Luxmore, 2009). An analysis of bat fatalities at wind energy facilities across the U.S. resulted in an estimate of 0 to 39 bats per MW (NWCC, 2010). Based upon post construction studies conducted between 2006 and 2009 at seven wind farms operating in New York, it is assumed that between 0.46 and 15.0 bat fatalities per megawatt could occur annually (Jain et al. 2007, Jain et al. 2008, Jain et al. 2009a, Jain et al. 2009b, Jain et al. 2009c, Jain et al. 2010a, Jain et al. 2010b, Stantec 2009, and Stantec 2010). Applying this range of impacts to the proposed and existing wind

projects discussed above, the 654 total MW's of the combined projects could result in an estimated range of 301 to 9,810 cumulative bat fatalities per year. Of these estimated fatalities, a range of approximately 44 to 1,440 fatalities are projected as a result of the operation of the Project. It is difficult to estimate the significance of these fatality ranges, as little is understood about North American bat populations.

9.0 EFFECTS ON USE AND CONSERVATION OF ENERGY RESOURCES

In the “Guide for Assessing Energy Use and Greenhouse Gas Emissions in an Environmental Impact Statement” (issued July 15, 2009) the NYSDEC Office of Air, Energy, and Climate states, “Global climate change is emerging as one of the most important environmental challenges of our time. There is scientific consensus that human activity is increasing the concentration of [greenhouse gas] in the atmosphere and that this, in turn, is leading to serious climate change. These climate changes will continue to affect the environment and natural resources of the State of New York” (NYSDEC, 2009b). This NYSDEC Guide is intended to identify methods and boundaries for the assessment of energy use, greenhouse gas emissions and mitigation measures in an EIS. Consistent with this requirement, the Guide recognizes that SEQRA can be used to identify and assess climate change impacts, as well as the steps to minimize the emissions of greenhouse gas that cause climate change. Many measures that will minimize emissions of greenhouse gas will also advance other long-established State policy goals, such as energy efficiency and conservation; the use of renewable energy technologies; waste reduction and recycling; and smart and sustainable economic growth.⁴

In response to the threats posed by global climate change, former Governor David Paterson issued Executive Order 24, which establishes a goal to reduce greenhouse gas emissions 80 percent by the year 2050, and includes a goal to meet 45 percent of New York’s electricity needs through improved energy efficiency and clean renewable energy by 2015. Emissions of CO₂ account for an estimated 88 percent of total greenhouse gas emissions in New York State. The overwhelming majority to these emissions, estimated at 250 million tons of CO₂ equivalent per year, result from fuel combustion. Overall, fuel combustion accounts for approximately 88.3% of total greenhouse gas emissions. The Project will help New York reduce CO₂ emissions because operation of the wind facility will generate electricity without emitting CO₂ or any other greenhouse gas pollutant.

In fact, zero-emission wind energy facilities can displace the electricity generated from conventional power plants, thereby potentially reducing the emissions of greenhouse gas pollutants, such as sulfur and nitrogen oxides (acid rain precursors), mercury, and carbon dioxide. 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

⁴In addition to the Guide, the NYSDEC is proposing revisions to the Full Environmental Assessment Form (EAF), which would require, in part, a more detailed analysis of a proposed action’s potential impact on air quality. Specifically, the revised EAF would require a relative quantification of greenhouse gas emissions such as carbon dioxide and nitrous oxide.

sufficient source of wind energy available. Wind energy is a preferred power source on an economic basis because the operating costs to run the turbines are so 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). The specific types of fossil fuel-fired power units and associated emissions that will be displaced by wind energy generation vary significantly among states and regions of the country. The displaced emissions of CO₂, NO_x, SO₂, and mercury generally will be greater in regions with large amounts of coal-fired generation and lower in areas where natural gas is the primary fuel (such as New England). However, even in New York and New England, where natural gas is a major source of generation, wind energy backs down some generating units fired by coal and residual oil at certain times (GE Energy, 2005).

In addition to the reduction of emissions of greenhouse gas pollutants in New York, the proposed Project will help the State achieve the goals of the 2009 State Energy Plan. (State Energy Planning Board, 2009). State Energy Law §6-104 requires the State Energy Planning Board to adopt a State Energy Plan. The New York State Energy Plan contains a series of policy objectives. Among these objectives is to increase the use of energy systems that enable the State to significantly reduce greenhouse gas emissions while stabilizing energy costs 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.

Based on the State Energy Plan, other public benefits of the Project include the following:

- Production and use of in-state energy resources can increase the reliability and security of energy systems, reduce energy costs, and contribute to meeting climate change and environmental objectives.
- To the extent that renewable resources and natural gas are able to displace the use of higher emitting fossil fuels, relying more heavily on these in-state resources will also reduce public health and environmental risks posed by all sectors that produce and use energy.
- By focusing energy investments on in-state opportunities, New York can reduce the amount of dollars “exported” out of the State to pay for energy resources.
- By re-directing those dollars back into the State economy, New York can start to increase its economic competitiveness with other states that are less dependent on energy supply imports to support their local economies.

- Increasing the percentage of energy derived from renewable resources will reduce the net retail price of electricity for all customers.
- Renewable energy contributes to the reduction of energy price volatility in the long-term.

The proposed Project will generate up to 96 MW of electricity without consuming cooling water or emitting pollutants. Assuming that the average house in New York uses approximately 7.2-megawatt hours (MWh) of electric power per year and that the average house in the United States uses approximately 11.2 MWh of electric power per year (U.S. Energy Information Administration, 2009), and assuming the Project generates approximately 30% of its nameplate generating capacity, this is enough power to support between approximately 22,500 and 35,000 homes in New York State (based on the New York and national averages).

In short, the Project will have a positive net benefit to energy use and conservation of energy resources, will help reduce greenhouse gas emissions in the State and will contribute to the goals and objectives of the State Energy Plan.

10.0 REFERENCES

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