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 Area[1].

Soil Association	Main Characteristics
Chaumont-Galoo-Wilpoint-Guffin[2]	• 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	• 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	• 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

[1]Information gathered from the Soil Survey of Jefferson County, New York (USDA, 1989).
[2]This soil association covers the vast majority of the Project area.

Table 5. Dominant Soil Map Units Within the Project Area[1].

Soil Map Unit	Main Characteristics
Chaumont silty clay 0-3 percent slopes	• 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	• 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	• 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	• Moderately well drained • Overlies limestone bedrock • Depth to bedrock is 20 to 40 inches • On convex slopes

[1]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 NYSA&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 is 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 the 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 thomasii*), 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 Site[1]

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

[1]Source – 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 (km^2). 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 Site[1]

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

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

[1]Source: BBA, BBS, Agency Correspondence, and On-site Surveys
[2]Also 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 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	*Haliaeetus leucocephalus*	State Threatened			7	5			**12**
barn owl[1]	*Tyto alba*	State Protected	1						**1**
black tern	*Chlidonias niger*	State Endangered		4					**4**
cerulean warbler	*Dendroica cerulea*	State Special Concern	2						**2**
common tern	*Sterna hirundo*	State Threatened		1					**1**
Cooper's hawk	*Accipiter cooperii*	State Special Concern			1	7	4		**12**
golden eagle	*Aquila chrysaetos*	State Endangered			3	1			**4**
grasshopper sparrow	*Ammodramus savannarum*	State Special Concern	35	5				5	**45**
Henslow's sparrow	*Ammodramus henslowii*	State Threatened	15	2				5	**22**
northern goshawk	*Accipiter gentilis*	State Special Concern				1			**1**
northern harrier	*Circus cyaneus*	State Threatened	21	21	66	31	1	11	**151**
osprey	*Pandion haliaetus*	State Special Concern		3	11	7			**21**
peregrine falcon	*Falco peregrinus*	State Endangered	1		2	5			**8**
red-shouldered hawk	*Buteo lineatus*	State Special Concern			3				**3**
sharp-shinned hawk	*Accipiter striatus*	State Special Concern		2	27	20			**49**
short-eared owl	*Asio flammeus*	State Endangered	1	3				2	**6**
upland sandpiper	*Bartramia longicauda*	State Threatened	14	13				5	**32**
vesper sparrow	*Pooecetes gramineus*	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 w*as* 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	*Myotis septentrionalis*
Eastern small footed myotis	*Myotis leibii*
Indiana bat	*Myotis sodalis*
Tri-colored bat	*Perimyotis subflavus*
Eastern red bat	*Lasiurus borealis*
Little brown bat	*Myotis lucifugus*
Big brown bat	*Eptesicus fuscus*
Silver-haired bat	*Lasionycteris noctivagans*
Hoary bat	*Lasiurus cinereus*

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
Foote 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).

<u>Bat Collision</u>

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 SO_2
- 130,685 tons of CO_2

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 (ºC) 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 CO_2 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 radically 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.