Bird and Bat Conservation Strategy for Ball Hill Wind Project Chautauqua County, New York

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List of Abbreviations and Acronyms

°C	degrees Celsius
°F	degrees Fahrenheit
AGL	above ground level
Audubon	The National Audubon Society
AWWI	American Wind Wildlife Institute
Ball Hill	Ball Hill Wind Energy, LLC
BBA	Breeding Bird Atlas
BBCS	Bird and Bat Conservation Strategy
BBS	breeding bird survey
BCID	Bat Call Identification Version 2.7c
BOS	Buffalo Ornithological Society
CBC	Christmas Bird Count
CFR	Code of Federal Regulations
CWA	Clean Water Act
CM	conservation measure
E & E	Ecology and Environment, Inc.
Eagle Act	Bald and Golden Eagle Protection Act
EMP	Eagle Management Plan
ECPG	*Eagle Conservation Plan Guidance Module 1 – Land-based Wind Energy*
EIS	Environmental Impact Study
EPA	(U.S.) Environmental Protection Agency
ESA	Endangered Species Act
HCP	Habitat Conservation Plan
HMANA	Hawk Migration Association of North America
IBA	Important Bird Area
IPaC	Information for Planning and Conservation
km	kilometers

List of Abbreviations and Acronyms (cont.)

kV	kilovolt
MBTA	Migratory Bird Treaty Act
m	meter
m/s	meters per second
met	meteorological
MLE	maximum likelihood estimation
mph	miles per hour
MW	megawatt
NAS	National Academy of Sciences
NHP	New York Natural Heritage Program
NLCD	National Land Cover Dataset
NMFS	National Marine Fisheries Service
Noble	Noble Environmental Power
NWCC	National Wind Coordinating Committee
NYSDEC	New York State Department of Environmental Conservation
NYSOA	New York State Ornithological Association
Project	Ball Hill Wind Project
ROW	right-of-way
SC	state species of special concern
SDI	Shannon Diversity Index
SWAP	(New York) State Wildlife Action Plan
T	threatened
T/E	threatened or endangered; also threatened and endangered
targets/km/hr	targets per kilometer per hour
USACE	U.S. Army Corps of Engineers
U.S.C.	United States Code
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WEG	*U.S. Fish and Wildlife Service Land-Based Wind Energy Guidelines*
WEST	Western EcoSystems Technology, Inc.
WNS	white-nose syndrome
WMA	Wildlife Management Area
Woodlot	Woodlot Alternatives

1 Introduction

1.1 Purpose

Nationwide and New York State goals to increase energy production from renewable sources due to increased energy demands has intensified the development of domestic energy projects, including wind energy facilities. In an effort to reduce the impacts of wind energy projects on bird and bat resources, the U.S. Fish and Wildlife Service (USFWS) recommends that wind energy project proponents develop a Bird and Bat Conservation Strategy (BBCS) that outlines the project development process and includes monitoring and conservation measures (CMs) that would be implemented to avoid and minimize impacts on birds and bats at each project they propose to develop. The recommendation for the development of a BBCS is part of the USFWS's *Land-Based Wind Energy Guidelines* (WEG; USFWS 2012a), which outlines a systematic approach for a wind energy developer to assess the potential risk to bird and bat resources during the preconstruction phase, evaluate the impacts on bird and bat resources resulting from the construction and operation of the project, and develop CMs and mitigation measures to avoid and minimize impacts during the preconstruction, construction, and operational phases of the project. Table 1-1 outlines the tiered approach described in the March 2012 *Land-Based Wind Energy Guidelines* (USFWS 2012a) and the actions taken by Ball Hill Wind Energy, LLC (Ball Hill) to adhere to the voluntary guidelines. The USFWS's tiered approach has been integrated into this document to show the process by which Ball Hill has evaluated the potential risks to bird and bat species in the development of this BBCS.

The purpose of this voluntary, project-specific BBCS for the Ball Hill Wind Project (Project) is to document and delineate a program designed to reduce the operational risks that could result from bird and bat interactions with the Project. The assessment of the potential environmental issues related to the development of the Project was initiated at the inception of the Project development process, including initial agency consultations and initial assessment of Project habitat for the potential occurrence of protected species. It incorporates input from USWS and NYSDEC over several meetings (see Section 3.2 Summary of Agency Consultations for more details). Potential impacts on bird species resulting from wind energy projects include habitat avoidance, loss of ecosystem structure and function, and direct mortality from collisions with wind turbines and other project infrastructure (American Wind and Wildlife Institute [AWWI] 2019 USFWS 2012a; Strickland et al. 2011; National Wind Coordinating Committee [NWCC]

2010; National Academy of Sciences [NAS] 2007). Potential impacts on bat species include loss of ecosystem structure and function and direct mortality from collisions with wind turbines and other project infrastructure (AWWI 2019; USFWS 2012a; Strickland et al. 2011; NWCC 2010; Arnett et al. 2008; NAS 2007). This BBCS is a voluntary document that summarizes the bird and bat studies conducted at the site to identify risks and document CMs throughout design, construction, and operation of the Project.

In addition, Ball Hill has developed an Eagle Management Plan (EMP; Appendix A) for the Project. The EMP documents Bald Eagle and Golden Eagle use of the Project Area, describes efforts made to reduce risk due to project development, documents communications and cooperation with the USFWS and NYSDEC, and presents the proposed post-construction monitoring and adaptive management approach for the Project. The EMP generally follows the USFWS *Eagle Conservation Plan Guidance Module 1 – Land-based Wind Energy* (ECPG; USFWS 2013) through Stage 1 (site assessment) and Stage 2 (site specific surveys and assessments), and partially Stage 4 (avoidance and minimization of risk but not compensatory mitigation). For a complete discussion of predicted risks and associated conservation measures for potential impacts on eagles, see the EMP (Appendix A).

Table 1-1 USFWS Tiered Approach to Assessing Potential Bird and Bat Impacts from Wind Energy Development

USFWS Tiers[1]	Actions Taken for Ball Hill Wind Project to Adhere to Each Tier
Tier 1 - Preliminary evaluation and screening of potential sites (landscape-scaled screening of potential Project sites)	■ This Project site was initially selected and developed by other wind companies. Noble Environmental Power (Noble) conducted desktop screening of land use, wind resources, transmission line capacity, and screening of potential threatened or endangered species issues. ■ Upon consideration of Project acquisition, Ball Hill Wind Energy, LLC (Ball Hill) conducted their own review of the above topics, as well as more detailed review of permit applications, environmental impact statements, agency correspondence and project data.

Table 1-1 USFWS Tiered Approach to Assessing Potential Bird and Bat Impacts from Wind Energy Development

USFWS Tiers[1]	Actions Taken for Ball Hill Wind Project to Adhere to Each Tier
Tier 2 - Site Characterization (broad characterization of one or more potential Project sites)	■ Noble conducted a fatal flaw analysis for early stage site characterization and conducted a literature review as part of a Bird and Bat Risk Assessment (E & E 2008). ■ Noble conducted initial agency consultation. ■ Upon consideration of Project acquisition, Ball Hill conducted a detailed review of permit applications, environmental impact statements, agency correspondence and project data, and met with local town officials, NYSDEC, and USFWS to get their thoughts on the site and previously proposed projects. ■ Ball Hill updated the literature review on local bird and bat studies (see Section 2.2).
Tier 3 - Pre-construction monitoring and assessments (site-specific assessments at the proposed Project site)	■ Agency consultation (see Section 3.2) ■ Field surveys (see Section 3.1 and Table 3-1): - Nocturnal radar study (fall 2006, spring 2007) - Raptor migration surveys (fall 2006, spring 2007, spring 2008) - Migratory bird surveys (spring 2007, spring 2008) - Breeding bird surveys (2007, 2008, 2011, 2016) - Bat acoustical monitoring (spring 2007, fall 2007, 2012) - Eagle use point-count surveys (March 2012 – February 2013; March 2016 – February 2017) - Northern long-eared bat habitat assessment and acoustic presence/absence surveys (Summer 2015) - Updated evaluation of potential impacts on birds and bats in the Supplemental Draft Environmental Impact Statement and Final Environmental Impact Statement
Avoidance and Minimization Measures	■ CMs during Design (see Section 4.2) ■ CMs during Construction (see Section 4.3) ■ CM during Operation (see Section 4.4) ■ Adaptive Management (see Section 4.5)
Tier 4 - Post-construction mortality and habitat studies	■ Proposed post-construction studies (see Section 5): - Mortality surveys and incidental reporting - Breeding bird surveys ■ Operations staff training (see Section 5.4) ■ Wildlife Incident Reporting System to capture mortality data from studies and incidental findings (see Section 5.5)
Tier 5 - Post-construction studies to further evaluate direct and indirect effects and assess how they might be addressed (if needed)	■ No "research" studies are planned initially. Implementation of adaptive management to adjust surveys and CMs if needed in response to Tier 4 post-construction studies (see Section 6)

Table 1-1 USFWS Tiered Approach to Assessing Potential Bird and Bat Impacts from Wind Energy Development

USFWS Tiers[1]	Actions Taken for Ball Hill Wind Project to Adhere to Each Tier

Note:
[1] USFWS 2012a.

1.2 Avian and Bat Regulations

1.2.1 Regulatory Overview

The Project is subject to all relevant federal, state, and local statutes and regulations. The key regulatory requirements for bird and bat species and their habitats are presented in Table 1-2.

Native birds in North America are protected primarily under three pieces of federal legislation: the Migratory Bird Treaty Act (MBTA), the Bald and Golden Eagle Protection Act (Eagle Act), and the Endangered Species Act (ESA). The only federal legislation that offers protection to bat species is the ESA.

Table 1-2 Key Regulatory Requirements

Authorization	Agency Authority	Statutory Reference
Federal		
Migratory Bird Treaty Act	USFWS	16 U.S.C. 703–711; 50 CFR 21 Subchapter B
Endangered Species Act	USFWS	Endangered Species Act (PL 93-205, as amended by PL 100-478 [16 U.S.C. 1531 et seq.]); 50 CFR 402
Bald and Golden Eagle Protection Act	USFWS	16 U.S.C. 668−668(d)
Section 404 of the Clean Water Act	USACE	33 U.S.C. 1344
State		
Endangered and Threatened Species of Fish and Wildlife; Species of Concern; Incidental Take Permits	NYSDEC	Section 11-0535 of the Environmental Conservation Law Part 182

Key:
CFR = Code of Federal Regulations
NYSDEC = New York State Department of Environmental Conservation
U.S.C. = United States Code
USACE = U.S. Army Corps of Engineers
USFWS = U.S. Fish and Wildlife Service

Native birds in North America are protected primarily under three pieces of federal legislation: the Migratory Bird Treaty Act (MBTA), the Bald and Golden Eagle Protection Act (Eagle Act), and the Endangered Species Act (ESA). The only federal legislation that offers protection to bat species is the ESA.

Section 404 of the Clean Water Act (CWA) is federal legislation that protects wetlands and waterbodies classified as Waters of the United States. Obtaining permits through the U.S. Army Corps of Engineers (USACE) for impacts on Waters of the United States can require an ESA Section 7 consultation with the USFWS to ensure that the action being permitted does not jeopardize federally listed threatened or endangered (T/E) species or their designated critical habitat.

New York State protects bird and bat species under Section 11-0535, Part 182 of the Environmental Conservation Law.

1.2.2 Migratory Bird Treaty Act

A migratory bird is any species or family of birds that lives, reproduces, or migrates within or across international borders at some point during its annual life cycle (USFWS 2011a). All migratory birds in North America are protected under the MBTA (16 U.S.C. 703-12). Specifically, the MBTA prohibits the take, kill, possession, transportation, purchase, and importation of migratory birds, their eggs, parts, and nests, except when specifically authorized by the Department of the Interior (16 United States Code [U.S.C.] 703). The word "take" is defined as any act that pursues hunting, wounding, killing, or capturing migratory birds (50 Code of Federal Regulations [CFR] 10.12).

An amendment to the MBTA in 1972 resulted in the inclusion of Bald Eagles and other birds of prey in the definition of migratory bird. The MBTA provides protection to 1,026 migratory bird species. While the MBTA has no provision for allowing unauthorized take, the USFWS recognizes that some birds may be taken during normal commercial practices adhering to "best management practices" to avoid and minimize impacts. In a recent United States District Court case, the United States of America v. Brigham Oil and Gas, et al. (2012), the Court ruled that "otherwise lawful commercial activity which indirectly kills a migratory bird does not violate the MBTA."

The MBTA contains provisions for criminal penalties for any persons who commit any acts outlined in the statutes. A violation of the MBTA by an individual can result in a fine of up to $15,000 and/or imprisonment for up to six months for a misdemeanor, and up to $250,000 and/or imprisonment for up to two years for a felony. Fines may be doubled for organizations. Penalties increase greatly for offenses involving commercialization and/or the sale of migratory birds and/or their parts. While violations of these statutes may result in prosecution, the USFWS in the *Land Based Wind Energy Guidelines* indicated that the USFWS will regard "voluntary adherence and communication as evidence of due care with respect to avoiding, minimizing, and mitigating significant adverse impacts on species protected under the MBTA and Eagle Act" (USFWS 2012a). Ball Hill has voluntarily implemented multiple pre-construction wildlife studies and communicated the results of these studies with the USFWS and NYSDEC as evidence of due care.

The MBTA excludes non-migratory upland game birds, introduced species such as the House Sparrow (*Passer domesticus*) and Rock Pigeon (*Columba livia*), and any recently listed unprotected species in the Federal Register.[1]

1.2.3 Endangered Species Act

The ESA (16 U.S.C. 1531-1544) was passed by Congress in 1973 in recognition that many of our nation's native plants and animals were in danger of extinction. The purpose of the ESA is "to provide a means whereby the ecosystems upon which endangered and threatened species depend may be conserved, and to provide a program for the conservation of these species." The ESA defines three fundamental terms as follows:

- An endangered species is defined as a species that is "in danger of extinction throughout all or a significant portion of its range."
- A threatened species is defined as a species that is "likely to become endangered within the foreseeable future."
- Critical habitat is defined as "specific geographical areas that are essential for the conservation and management of a listed species, whether occupied by the species or not."

Federal agencies are directed to use their authority to conserve listed species and make sure that their actions do not jeopardize the continued existence of these species. Federal agencies are encouraged to do the same with respect to "candidate" species that may be listed in the near future. The law is administered by the USFWS and the Commerce Department's National Marine Fisheries Service (NMFS). These two agencies work with other federal and state agencies as well as private landowners to provide protection of species through planning and modification to projects that will provide minimal impacts on listed species and their habitats.

Section 9 of the ESA makes it unlawful for a person to "take" a listed species (i.e., harm, harass, kill, or modify habitat in a way that is harmful). However, permits for "incidental take" can be obtained from the USFWS for non-purposeful take of endangered species that would occur as a result of an otherwise legal activity.

For projects that may impact or cause takes of T/E species, consultation with the USFWS is required under Sections 7 and 10. Section 10 of the ESA allows for the development of habitat conservation plans (HCPs) for endangered species on private lands or for the maintenance of facilities on private lands. This provision is designed to assist private landowners in incorporating CMs for listed species into their land and/or water development plans. Private landowners who develop and implement an approved HCP can receive an incidental take permit that allows

[1] For a complete list of species protected under the MBTA see**:** https://www.fws.gov/migratory-birds/pdf/policies-and-regulations/ListofMBTAProtectedSpecies1312.pdf

their development to proceed as long as the Project remains under the threshold for take defined by the incidental take permit.

1.2.4 Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act of 1940 (Eagle Act) provides further protection for Bald Eagles and Golden Eagles (16 U.S.C. 668−668(d)). The Eagle Act prohibits the take, possession, or any acts thereof, of any Bald or Golden Eagle, part, nest, or egg (16 U.S.C. 668). The Eagle Act defines "take" as any act that pursues hunting, wounding, killing, capturing, or disturbing, etc. (16 U.S.C. 668c). "Disturb" is defined as agitating or bothering an eagle that causes injury to or decreases productivity of the eagle or causes nest abandonment by the eagle. In 2009, the USFWS finalized new regulatory "take" permits that specifically authorize incidental take of eagles and eagle nests in certain situations. The permits allow for: (1) non-purposeful take of eagles that cannot be avoided and results in disturbance or mortality; (2) the removal of eagle nests that pose a threat to people or eagles; and (3) removal or mitigation for removal that will provide a benefit to eagles.

Permits are available for all activities that kill or disturb eagles. However, no permit would be available unless an applicant has first voluntarily taken all practicable steps to avoid the take of eagles (50 CFR 22). Permit holders are subject to periodic review and issued permits can be revoked for any take exceedance. Permit applications can be found at http://www.fws.gov/migratorybirds/mbpermits.html. To date, only six wind project eagle take permit applications have been submitted and approved. They include: Horse Butte Wind (Idaho), Rock Creek Wind (Missouri), Pioneer Wind Park I (Wyoming), Ocotillo Express Wind Project (California) and Shiloh IV Wind Farm (California).

Penalties for the "take" of an eagle without a permit may result in a fine of up to $100,000 and/or imprisonment for up to one year. The Eagle Act has additional provisions where, in the case of a second or subsequent conviction pursuant to the Eagle Act, penalties may be imposed of up to a $250,000 fine and/or two years' imprisonment.

Section 404 of the Clean Water Act

The CWA was implemented to restore and maintain the chemical, physical, and biological integrity of the nation's waters. Section 404 of the CWA requires that a permit be obtained for the discharge of dredged or fill material into waters of the United States, including wetlands and streams. Waters of the United States are defined under 33 CFR, and wetlands are specifically defined under 33 CFR Part 328.3(b). Wetlands and streams are regulated by the USACE, which is the permitting agency responsible for Section 404 permits. The CWA protects all waters of the United States over which the USACE has jurisdiction.

Each USACE district has regulatory jurisdiction over traditionally navigable waters within its respective boundaries. Chautauqua County, New York, is regulated by the USACE Buffalo, New York, Regulatory District.

1.2.5 New York State Regulations

Part 182: Endangered and Threatened Species of Fish and Wildlife; Species of Special Concern; Incidental Take Permits of the New York Codes, Rules and Regulations (6 CRR-NY § 182: 2-4) allows the state to list a wildlife species as T/E within the state of New York, protects species that are state-listed as T/E from take, and prohibits species of special concern from being removed from the wild.

The criteria for listing a species as T/E or a species of special concern in New York is described in the New York Codes, Rules and Regulations (6 CRR-NY § 182: 2-4). The criteria establish three categories for describing rare wildlife species:

***(A) State endangered species**: An endangered species may be one of the following:*

(i) a native species that is in imminent danger of extirpation or extinction in New York.

(ii) a species that is listed as endangered by the United State Department of the Interior.

***(B) State threatened species**: A threatened species may be one of the following:*

(i) a native species likely to become an endangered species within the foreseeable future in New York.

(ii) a species listed as threatened by the United States Department of the Interior.

***(C) Special concern species**: A special concern species is a native species of fish or wildlife found by the department to be at risk of becoming threatened in New York. Species of special concern do not qualify as either endangered or threatened but have been determined by the department to require some measure of protection to ensure that the species does not become threatened.*

Currently, 21 bird species and two bat species are listed as T/E by the State of New York (6 CRR-NY § 182: 2-4), and 19 bird species and one bat species are listed as species of special concern by the State of New York (6 CRR-NY § 182: 2-4).

2 Tiers 1 and 2 - Site Selection and Site Characterization

2.1 Initial Site Selection

Beginning in 2004, Noble, the original Project sponsor, undertook a statewide study to identify potential commercial-scale wind generating project areas. Numerous potential project areas were identified in northern and western New York State. The potential areas were evaluated using the following criteria: availability of sufficient wind resources; proximity to existing roads and transmission lines; and availability of contiguous land.

The proposed Project Area in the towns of Villenova and Hanover was identified for many reasons. The National Grid 230-kilovolt (kV) Dunkirk-Gardenville transmission line that runs through the town of Hanover makes electrical transmission possible in this area. The availability and proximity of this high-voltage transmission line also enhances the efficiency of the Project, versus delivery at lower voltage, by reducing transmission line "losses."

Transportation in and through Chautauqua County and the towns of Villenova and Hanover is provided by a well-developed system of local, county, and state roads. The Project Area also includes some existing farm and logging roads. Improving these existing roads for Project access would minimize the disturbance of additional areas for new roads. The Project Area is primarily comprised of privately owned lands. Many of the properties are large parcels that are currently, or were formerly, used for farming and have a low population density, making them attractive for wind energy development. Large, sparsely settled parcels require fewer leases and less encroachment on residential uses. No fatal flaws were identified during this analysis. Noble then proceeded with development, including agency coordination and collection of site-specific data and verification of the wind resources.

In 2015, Ball Hill continued development of the Project in its original location. Ball Hill continued to obtain agreements with landowners within the Project Area that would allow for the construction of turbines, access roads, a substation and switchyard, collection lines, and other Project facilities on their property. Ball Hill continued agency coordination.

2.2 Environmental Setting

2.2.1 Land Cover/Land Use

Land use and land cover data for the Project were obtained from the United States Geological Survey (USGS) National Land Cover Dataset (NLCD; Homer et al. 2015). The NLCD consists of raster data developed through remote-sensing technology. Land uses within the Project Area are predominantly a mix of forested (5,211 acres, 53.6%) and agricultural (4,216 acres, 43.4%) land. Additional acreage within the Project Area consists of wetlands, roads and other paved surfaces, scattered residences, buildings, and open-water features such as farm ponds. The principal agricultural enterprise is dairy farming. Corn and hay are the main crops, but other crops also are grown. The northern portion of the Project Area in the town of Hanover includes vineyards and orchards. Most of the natural stands are represented by mixed hardwoods dominated by sugar maple (*Acer saccharum*), red oak (*Quercus rubra*), black cherry (*Prunus serotina*), white ash (*Fraxinus americana*), and American beech (*Fagus grandifolia*). Current and historic silviculture is evident throughout the Project Area. Land use/land cover at the Project Area is depicted on Figure 1 and in Table 2-1.

Table 2-1 Existing Land Use, Ball Hill Wind Project (acres)

Land Use/Land Cover	Town of Villenova	Town of Hanover	Total
Agricultural[1]	3,263	998	4,261
Forested[2]	3,614	1,597	5,211
Developed[3]	168	63	231
Open Water	10	1	12
Total[4]	**7,055**	**2,659**	**9,715**

Source: Homer et al. 2015.

Notes:

1 Agricultural land use includes the USGS Land Use/Land Cover categories of Pasture/Hay; Grassland/Herbaceous; Cultivated Crops; and Emergent Herbaceous Wetlands.

2 Forested land use includes the USGS Land Use/Land Cover categories of Deciduous Forest; Evergreen Forest; Mixed Forests; Scrub-Shrub; and Woody Wetlands.

3 Developed land use includes the USGS Land Use/Land Cover categories of Developed, Open Space; Developed Low Intensity; and Developed High Intensity.

4 Table totals may not add up due to rounding.

2.2.2 Ecoregions

U.S. Environmental Protection Agency (EPA) ecoregions delineate areas of general similarity in ecosystem form and function and are important to identify during project background investigations as they provide general information about floral/faunal habitat within a given area. The EPA has developed a hierarchical scale of ecoregion levels I through IV, with level IV being the most detailed.

Figure 1 Project Area

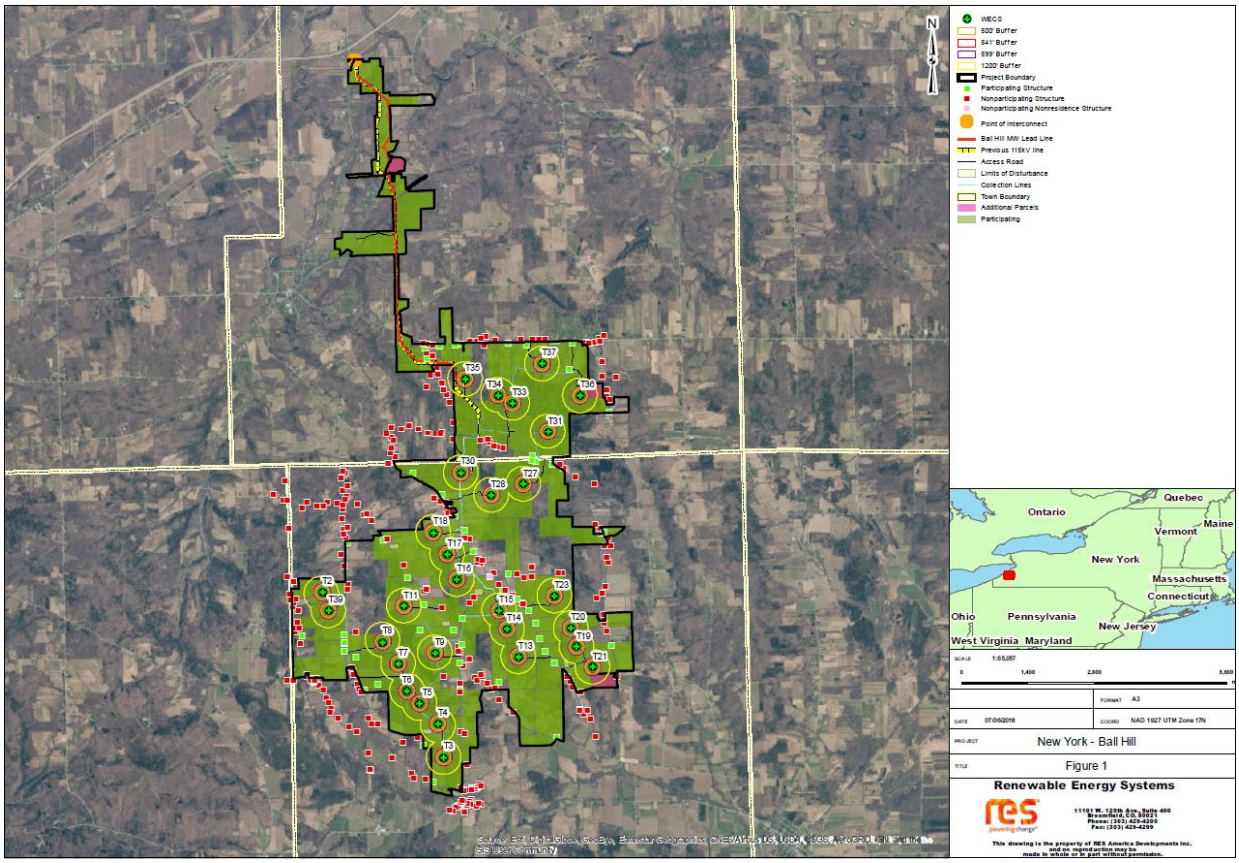

TABLE 1. BALL HILL WIND PROJECT SUMMARY OF CHANGES FROM THE 2016 SPECIAL USE PERMIT	
FACILITY	**MODIFICATIONS AND RATIONALE**
Turbine 2	Turbine moved ±129' to comply with larger setback
Turbine 4	Turbine moved ±132' to comply with larger setback
Turbine 8	Turbine moved ±128' to comply with larger setback
Collection Substation	Eliminated; reduce noise and light impacts
5.7-mile Overhead Transmission Line	Eliminated; replaced with four +/- 5.0 mile predominantly underground circuits to avoid and/or reduce wetlands, tree clearing and visual impacts.

The Project Area lies within one EPA level IV ecoregion, the Erie/Ontario Lake Plain (EPA 2016). This ecoregion covers 1,449 square miles of land between elevations of 246 to 900 feet (20 to 200 meters) and consists of mostly flat lake plains and dunes behind Pleistocene beachline ridges drained by small streams. Pre-settlement forest cover was dominated by beech-maple forest interspersed with chestnut and oaks. At present, most of this forest lies within remnant woodlots following clearing for agriculture. Where not cleared for cropland, wooded wetlands and grasslands also occur. Current forest cover still consists of beech-maple forest, but it is now interspersed with elms, ashes, and tulip trees and has a diverse herbaceous understory.

2.2.3 Important Bird Areas and Other Protected Areas

The National Audubon Society (Audubon) developed the Important Bird Area (IBA) program to identify a network of sites that provide critical habitat for birds. Audubon New York does not identify any IBAs within the Project Area. Two IBAs, Wheeler's Gulf and Dunkirk Harbor/Point Gratiot, are located within 10 miles (16 km) of the Project Area; both are located in Chautauqua County (Audubon 2013).

Wheeler's Gulf is located approximately 8 miles (13 km) west of the Project Area in the Town of Pomfret in Chautauqua County. The 210-acre site is a beaver pond complex in a deep valley with mature forest on both sides. This site is mostly privately owned and supports a high diversity of bird species (Audubon 2013). The IBA criteria for the site are met for one Audubon bird species at risk, Cerulean Warbler.

Dunkirk Harbor/Point Gratiot is a 755-acre area along the shoreline of Lake Erie, approximately 9 miles (14.5 km) northwest of the Project Area in the town of Dunkirk, Chautauqua County. Much of the area is corporately or privately owned. When the power plant is operating, warm-water discharges into the harbor and the area is free of ice in the winter, attracting numbers of waterfowl and other waterbirds. The site is also a known stopover site for migratory species. The IBA criteria for the site are met for one Audubon bird species at risk, Common Tern, plus there are large congregations of waterfowl, gulls, and individual species, such as the Red-breasted Merganser. Several state-listed bird species occur at this site, including Common Loon (migrant) and Pied-billed Grebe (wintering). This site is also one of few locations in western New York with breeding Red-headed Woodpeckers, a state species of special concern (Audubon 2013).

Canadaway Creek Wildlife Management Area (WMA) is not an Audubon IBA, but it is located in the Town of Arkwright, Chautauqua County, 3 miles (5 km) west of the Project Area. This WMA is 2,160 acres of hardwood forest interspersed with conifer plantations that are maintained for Ruffed Grouse habitat. Canadaway Creek WMA is managed largely to produce forest crops, maintain diverse wildlife habitat, and provide recreational opportunities (NYSDEC 2019).

Although these IBAs and the WMA contain habitats unique to the area and/or habitats that are not degraded or heavily impacted by humans (Audubon 2013), neither is proximate to the Project Area or likely to be impacted by the Project.

2.2.4 Avian Literature Review Summary

2.2.4.1 New York State Breeding Bird Atlas

The New York State Breeding Bird Atlas (BBA) project was an extensive survey to determine the current distribution of breeding bird species in New York State. Volunteer birders recorded evidence of breeding bird species throughout the state within 5-kilometer (km) by 5-km blocks. The data provide evidence of breeding composition and, in general, quality of breeding habitat. Depending on the breeding evidence observed, species were classified as possible, probable, or confirmed breeders. Surveys for the first atlas were conducted between 1980 and 1986 (Andrle and Carroll 1988). Surveys for the Atlas 2000 project were subsequently completed from 2000 to 2005 (McGowan and Corwin 2008), allowing a comparison to the results of the first atlas to see how the distribution of breeding birds had changed. A total of 76 species was considered the statewide goal for species diversity per block; once that target was reached, volunteers were encouraged to move on to other blocks. The statewide average was 71 species per block, though it varied widely by region (McGowan and Corwin 2008).

The Project Area is located within seven New York State BBA blocks (1569A, 1570A, 1570B, 1570C, 1570D, 1571C, and 1571D). Only very limited portions of the Project Area overlap with BBA blocks 1569A and 1571D.

A combined total of 109 species was identified in the seven atlas blocks (Ecology and Environment, Inc. [E & E] 2008). The species identified in these seven blocks are generally consistent with regularly occurring nesting species for the region. Several state-listed species were included among the species documented in these blocks during the Atlas 2000 project (SC = state species of special concern; T=threatened): American Bittern (SC), Northern Harrier (T), Sharp-shinned Hawk (SC), Cooper's Hawk (SC), Northern Goshawk (SC), Red-shouldered Hawk (SC), Upland Sandpiper (T), Red-headed Woodpecker (SC), Horned Lark (SC), Sedge Wren (T), Golden-winged Warbler (SC), Yellow-breasted Chat (SC), Vesper Sparrow (SC), Grasshopper Sparrow (SC), and Henslow's Sparrow (T). All of these species were detected only in small numbers (E & E 2008). See the Bird and Bat Risk Assessment in the Draft Environmental Impact Study (EIS) for more details on species identified in the BBA.

2.2.4.2 USGS Breeding Bird Surveys

Breeding bird surveys (BBSs) are conducted annually by volunteers during the peak nesting season (June for northern states, May and June for southern states) as part of a long-running, widespread monitoring program implemented by the USGS (Pardieck et al. 2016). All birds heard or observed are documented using a specified protocol. Surveys are conducted for 3 minutes at 50 locations, one-half mile (0.8 km) apart, starting 30 minutes before sunrise. The BBS data provide a

valuable source of information on bird populations and trends over time in given areas, both locally and nationally.

There are four BBS routes where at least a portion of the route is within 10 miles (16 km) of the Project Area: Cattaraugus (surveyed from 1967-2018, except 1976-77, 1980-82, and 1984), Randolph (surveyed from 1967-2018, except 1986), Sheridan (surveyed from 1966-1998), and Nashville (surveyed from 1967-2018, except 2003-2011 and 2013-2017) (Sauer et al. 2017). The species identified on these BBSs are similar to those observed during the New York State BBA project and are generally consistent with regularly occurring nesting species for the region. From 1966 to 2018, 18 state-listed species were included among the species documented in these BBSs. These species are listed in Table 2-2 along with the average number of birds per survey route and the last year they were detected. No federally listed species were identified during these surveys. All of these species were detected only in small numbers during the surveys, and several have not been detected in many years. Of these species, only Osprey, Northern Harrier, Sharp-shinned Hawk, Cooper's Hawk, Bald Eagle, Red-shouldered Hawk, Horned Lark, and Grasshopper Sparrow have been detected on one of these routes during the last 10 years. Note, however, that the Sheridan BBS route has not been surveyed since 1998 and the Nashville BBS route was not surveyed during the periods of 2003 to 2011 and 2013 to 2017.

Table 2-2 State-listed Species Detected on BBS Routes near Project Area

Species List	Status	Average Number of Birds/Route (Last Year Detected)			
		Cattaraugus	Randolph	Sheridan	Nashville
Least Bittern	T	-	-	-	0.03 (1968)
American Bittern	SC	0.16 (1999)	0.02 (1982)	-	0.03 (1974)
Osprey	SC	-	0.15 (2018)	-	-
Northern Harrier	T	-	0.23 (2008)	0.09 (1988)	0.09 (1997)
Sharp-shinned Hawk	SC	0.07 (1989)	0.09 (2012)	0.06 (1990)	0.06 (2018)
Cooper's Hawk	SC	0.16 (2012)	0.09 (2006)	-	0.09 (2003)
Northern Goshawk	SC	0.02 (1987)	-	-	-
Bald Eagle	T	-	-	-	0.03 (2018)
Red-shouldered Hawk	SC	0.23 (2014)	0.51 (2017)	0.19 (1980)	0.20 (2018)
Upland Sandpiper	T	0.02 (1973)	0.11 (2000)	1.28 (1989)	0.31 (1991)
Red-headed Woodpecker	SC	-	0.11 (1974)	0.09 (1987)	0.20 (1978)
Horned Lark	SC	0.09 (1973)	0.89 (2012)	0.06 (1980)	0.46 (1986)
Sedge Wren	T	-	-	-	0.03 (1973)
Golden-winged Warbler	SC	-	0.04 (1972)	-	0.03 (1967)
Yellow-breasted Chat	SC	-	-	0.03 (1975)	-
Vesper Sparrow	SC	0.91 (1978)	0.72 (2002)	0.16 (1982)	0.83 (1991)
Grasshopper Sparrow	SC	0.33 (1973)	0.15 (1972)	1.06 (1990)	0.69 (2018)
Henslow's Sparrow	T	-	0.02 (1967)	0.47 (1989)	0.54 (1987)

Source: Sauer et al. 2017

Key:
SC = State species of special concern.
T = State-threatened.

2.2.4.3 Audubon Christmas Bird Counts

The primary objective of the Audubon's Christmas Bird Count (CBC) is to monitor the status and distribution of wintering bird populations across the Western Hemisphere. The CBC is an all-day census of early winter bird populations within 15-mile (24-km) -diameter survey areas. The results are compiled into the longest running database in ornithology, representing over a century of continuous data on trends of early winter bird populations across the Americas. The CBCs are conducted mostly by volunteer birders (Audubon n.d.[a]). The CBC data provide a good overview of the species that occur regionally in early winter in similar habitat and are available from an Audubon website (Audubon n.d.[b]). Birds observed during CBCs conducted near the Project Area provide information on birds likely occurring in the Project Area during the winter months in similar habitat. However, past observations of bird species during the CBC do not mean that such species are currently present in or near the Project Area.

The closest CBC is the Dunkirk-Fredonia count. The Dunkirk-Fredonia CBC is centered approximately 3 miles (4.8 km) southeast of the city of Fredonia, which is approximately 5 miles (8 km) northwest of the Project Area. Given that a 15-mile (24-km) -diameter area is surveyed, the western half of the Project Area is included in this count.

This CBC also includes areas along the shoreline of Lake Erie; as such, several of the species observed are considered coastal species and would not be observed within the Project Area. A total of 141 species were identified on this CBC from January 1966 through January 2017 (45 surveys; surveys were not conducted from 1974 through 1981) (Audubon n.d.[b]). The number of species counted each year ranged from a minimum of 27 species in 1969 to 74 species in 1988, with an average species count during this time period of 57.6 species. No federally listed species were identified during this period.

Another CBC that is nearby is the Jamestown count, which is centered in the city of Jamestown approximately 18.5 miles (30 km) south of the Project Area. This CBC includes Chautauqua Lake; as such, several of the species observed are only found in larger waterbodies and may not be observed within the Project Area. A total of 146 species were identified on this CBC from December 1923 through December 2017 (77 surveys; surveys were not conducted in 1927, 1928, 1931 to 1944, 1977, and 2002) (Audubon n.d.[b]). The number of species counted each year ranged from a minimum of 17 species in both 1923 and 1930, to 82 species in 1998, with an average species count during that time period of 57.4 species. No federally listed species were identified during this period.

Over the years, the same 13 state-listed species have been detected in both the Dunkirk-Fredonia and Jamestown CBCs; one additional species of concern, the Osprey, was detected in the Dunkirk-Fredonia CBC. Table 2-3 shows the percentage of all counts with detection of each of these species for each CBC.

Table 2-3 Percentage of All Counts with Detection of State-listed Species at the Dunkirk-Fredonia and Jamestown CBCs

Species	Status	% of Counts with Species Detection	
		Dunkirk-Fredonia CBC (Out of 45 counts)	Jamestown CBC (Out of 77 counts)
Common Loon	SC	16	16
Pied-billed Grebe	T	87	55
Osprey	SC	2	0
Northern Harrier	T	38	29
Sharp-shinned Hawk	SC	82	75
Cooper's Hawk	SC	73	81
Northern Goshawk	SC	9	10
Bald Eagle	T	22	32
Red-shouldered Hawk	SC	16	32
Short-eared Owl	E	11	13
Red-headed Woodpecker	SC	4	8
Peregrine Falcon	E	11	1
Horned Lark	SC	31	53
Vesper Sparrow	SC	2	1

Source: Audubon n.d.(b)

Key:
E = Endangered
SC = State species of special concern
T = Threatened

2.2.4.4 eBird

eBird (eBird.org) provides publicly available data from its online global citizen science database, a project managed by the Cornell Laboratory of Ornithology and Audubon (eBird n.d.). First launched in 2002, eBird allows for real-time display and the ability to download data entered by its users. Users range from professional field ornithologists to recreational birders. The database allows users to track their sightings while simultaneously contributing spatial and seasonal distribution data for bird species across the world.

Although limitations exist with data standardization and level of effort not being uniform across geographic regions and habitats, eBird fills gaps in avifaunal knowledge across the globe since the data is not limited to that produced only by scientific surveys within smaller and fewer geographic areas. The database is managed by regional reviewers, usually local experts who are familiar with the avifauna present within their county, territory, or state. Data can be searched by date, region, species, and site-specific locations grouped by designated eBird hotspots or by personal locations from submitted checklists. Even though eBird has only been in existence since 2002, users can enter data from earlier dates, and

numerous state bird record committees have added previously peer-reviewed sightings into eBird.

As of now, 303 species have been reported to eBird from Chautauqua County, where the Project Area is located (eBird 2019a). There are 13 eBird hotspots within approximately 5 miles (8 km) of the Project Area: Sheridan Cemetery and Fields, Canadaway Creek Wildlife Management Area, Boutwell Hill State Forest, Farrington Hollow Road Marsh, Lewis Road Grasslands, Rushing Stream Audubon Preserve, Burham Road Swamp, Hickory Flats on Route 322, Mezzio Road, Cattaraugus Creek Outlet, Sunset Bay State Marine Park, Silver Creek Boat Launch, and Eagle Bay (eBird 2019b). Over the last 10 years 18 state-listed species have been documented across these 13 hotspots (see Table 2-4). Although less likely to occur within the Project Area due to a relative scarcity of waterbodies present, water-based species such as grebes, loons, Osprey, Bald Eagle, and Common Tern have been reported within or nearby to the Project Area as incidental migrants passing through or utilizing ponds and small lakes away from Lake Erie. The majority of Red-headed Woodpecker and Peregrine Falcon sightings come from the harbor towns of Dunkirk-Fredonia northwest of the Project Area, where most of the sightings probably pertain to the same few, long-staying individuals.

Table 2-4 State-listed Species Reported in eBird within 5-miles (8 km) of the Project Area (2009-2019)

Species	Status
Pied-billed Grebe	T
Common Loon	SC
Osprey	SC
Northern Harrier	T
Bald Eagle	T
Sharp-shinned Hawk	SC
Cooper's Hawk	SC
Northern Goshawk	SC
Red-shouldered Hawk	SC
Common Tern	T
Short-eared Owl	E
Common Nighthawk	SC
Red-headed Woodpecker	SC
Peregrine Falcon	E
Horned Lark	SC

Table 2-4 State-listed Species Reported in eBird within 5-miles (8 km) of the Project Area (2009-2019)

Species	Status
Cerulean Warbler	SC
Vesper Sparrow	SC
Grasshopper Sparrow	SC

Source: eBird 2019b

Key:
E = Endangered
SC = State species of special concern
T = Threatened

Some of the species listed in the USFWS Information for Planning and Conservation (IPaC) as potentially occurring within the Project Area in Chautauqua County have also been reported within 5 miles (8 km) of the Project Area in eBird, shown in Table 2-5 (USFWS 2016c). Most of the passerines may be breeders and migrants in the area.

Table 2-5 Species on USFWS IPaC List Reported in eBird within 5 miles (8 km) of Project Area (2009-2019)

Species
Black-crowned Night-Heron
Black-billed Cuckoo
Olive-sided Flycatcher
Willow Flycatcher
Wood Thrush
Blue-winged Warbler
Canada Warbler

Sources: eBird 2019b; USFWS 2016c

Key:
IPaC = Information for Planning and Conservation
USFWS = USFWS Information for Planning and Conservation

2.2.4.5 Regional Reports

E & E reviewed the Region 1, Niagara Frontier, quarterly reports in *The Kingbird*, a publication of the New York State Ornithological Association (NYSOA). NYSOA Region 1 includes Niagara, Erie, Chautauqua, Cattaraugus, and Allegany counties, and the western portions of Wyoming, Genesee, and Orleans counties. All reports from 2006 to 2018 were reviewed for bird sightings within or nearby the Project Area in Chautauqua County. The Buffalo Ornithological Society (BOS) maintains a database of avian records dating back to 1964 for NYSOA Region 1 and adjacent portions of Ontario, which E & E searched for records of federally and state-listed species (BOS 2017). No additional listed species sightings were found for the Project Area by searching for Hanover and Villenova.

2.2.4.6 Recent Bird Studies in Proximity to the Project Area

Arkwright Summit Wind Farm

Bird surveys were conducted in proximity to the Project Area as part of the permitting process for a proposed wind energy project (Arkwright Summit Wind Farm, originally named New Grange Wind Farm) . The closest turbine of the Arkwright Summit Wind Farm is approximately 1.4 miles (2.3 km) to the southwest of the Project. A summary of the results from this bird study are included in this section.

A nocturnal radar study was conducted in the spring and fall of 2007 as part of the permitting effort for the New Grange Wind Farm (EDP 2008). Western EcoSystems Technology, Inc. (WEST) conducted the study between April 25 and June 8, 2007, and between August 16 and October 17, 2007. Mean passage rates when the radar was in the horizontal mode were 175.2 ± 20.5 targets per km per hour (targets/km/hr) and 111.9 ± 6.0 targets/km/hr for the spring and fall surveys, respectively. When the radar was in the vertical mode, mean passage rates were 635.0 ± 30.1 targets/km/hr and 178.1 ± 7.0 targets/km/hr for the spring and fall surveys, respectively. The mean flight direction in the spring was 17.5°, while in the fall it was 207.8°. Mean flight altitudes were 449.9 ± 2.2 meters (1,476.0 ± 7.2 feet) and 457.9 ± 2.0 meters (1,502.3 ± 6.6 feet) above radar level for the spring and fall surveys, respectively. Approximately 13% of all nocturnal targets in the spring and 10% of all nocturnal targets in the fall flew below an altitude of 125 meters (410 feet).

WEST conducted spring and fall raptor surveys in the New Grange Project Area in both 2005 and 2007. For both years combined, 98 individual raptors from seven species were observed during the spring surveys. The migratory passage rate for the spring surveys was three raptors per observer hour. For both years combined, 212 individual raptors from eight species were observed during the fall surveys. The migratory passage rate for the fall surveys was six raptors per observer hour. Red-tailed Hawk and Turkey Vulture were the two most prevalent species observed in both the spring and fall. One state-listed threatened species (Northern Harrier) and three state special concern species (Cooper's Hawk, Sharp-shinned Hawk, and Red-shouldered Hawk) were documented. All state-listed species except for the Cooper's Hawk, which was observed only in the spring, were observed during both the spring and fall surveys.

A breeding bird survey over three consecutive days was conducted by WEST in 2007. The survey consisted of a 3-minute point count at each of the 30 survey points. Survey points were located on public roads and private lands and were selected to cover as much of the proposed development area as possible. Breeding bird surveys were conducted on June 21, 22, and 23, 2007. A total of 1,117 birds of 77 species were recorded during the survey. The most numerous species recorded were European Starling, Red-winged Blackbird, and American Crow. Species identified during these surveys were generally consistent with those expected

for the geographic area. No threatened or endangered species were identified, but one state species of special concern, Sharp-shinned Hawk, was observed.

Kerns et al. (2008) concluded the following: (1) the Arkwright area was not a migration corridor for raptors, (2) nocturnal migration characteristics were similar to those of other studies conducted in the eastern United States, (3) the project area did not support large or unusual populations of breeding resident birds, and (4) this project would not significantly impact state-listed bird species. Overall, the report concluded that impacts on birds from the Arkwright Summit project would be similar to or less than other eastern wind projects studied.

During June of 2009, WEST conducted a survey to assess potential habitat within the Arkwright project area for five sensitive, state-listed T/E grassland bird species: Northern Harrier (*Circus cyaneus*), Upland Sandpiper (*Bartramia longicauda*), Short-eared Owl (*Otus flammeus*), Henslow's Sparrow (*Ammodramus henslowii*), and Grasshopper Sparrow (*Ammodramus savannarum*) (WEST 2009). Their survey determined that five of the proposed wind turbine sites were located either nearby or within suitable grassland habitat that may harbor these sensitive grassland bird species. Additionally, three sites within a 1.5-mile (2.4-km) buffer outside the project area also contained grassland habitat suitable for this suite of species.

WEST conducted breeding bird surveys from May to July 2013 and detected 73 species, made 1,168 bird observations within 914 separate groups, and detected 6.45 species per transect per survey (WEST 2013a). Approximately 95% of all birds observed were passerines, predominantly icterids (blackbirds and orioles), warblers, thrushes, and grassland sparrow species. Overall mean bird use across the project area was 13.71 birds per transect per survey, with highest bird use at transects dominated by grassland habitat. Detections of federal or state special concern (SC) species included one American Bittern (*Botaurus lentiginosus*) (state SC species), one Olive-sided Flycatcher (*Contopus cooperi*) (USFWS IPaC species), and two Cerulean Warblers (*Setophaga cerulean*) (state SC species).

Acoustic broadcast surveys to detect nesting raptors were conducted by WEST in June and July 2013 (WEST 2014). The surveys recorded 16 visual or aural identifications of three species at eight of 60 call stations: 13 Red-shouldered Hawks (*Buteo lineatus*) (a state SC species), two Red-tailed Hawks (*Buteo jamaicensis*), and one American Kestrel (*Falco sparverius*).

Eagle use surveys were conducted by WEST from May to August 2013 (WEST 2013b). One Bald Eagle (*Haliaeetus leucocephalus*) (state-threatened) was found, resulting in a total eagle use value of 0.01 eagles per plot per survey for the project area. Eight additional bird species were found during these surveys, with 239 bird observations within 142 separate groups. The most abundant species were Turkey Vulture (*Cathartes aura*), American Crow (*Corvus brachyrhynchos*), Red-tailed Hawk, and American Kestrel. One state SC species, Sharp-shinned Hawk (*Accipiter striatus*), was detected.

Cassadaga Wind Project

Another project site near Ball Hill is the Cassadaga Wind Project, which was surveyed in 2013 and 2014 by Stantec for EverPower Wind Holdings, Inc. . The proposed Project covers approximately 24,000 acres in Chautauqua County, New York, and is located in the towns of Stockton, Charlotte, Cherry Creek, and Arkwright.

Migratory bird surveys were conducted by Stantec in spring 2013 at the Cassadaga Wind Project (Stantec 2015). A total of 601 birds of 27 species were found during the study, and no federally or state-listed T/E or SC species were detected.

Raptor migration surveys were conducted in spring 2014 (Stantec 2015). A total of 11 raptor species were found, with an average passage rate of 1.64 raptors per hour and a range of 0 to 5.1 raptors per hour. Raptor passage numbers were within the low end of typical passage rates, raptor activity, and species composition for New York and northeastern United States sites. Detections of federally or state-listed T/E or SC species included one Golden Eagle (*Aquila chrysaetos*) (state endangered), six Bald Eagles (state threatened), one Northern Harrier (state threatened), three Ospreys (*Pandion haliaetus*) (state SC species), three Red-shouldered Hawks (state SC species), and four Sharp-shinned Hawks (state SC species).

Breeding bird surveys conducted during spring 2014 documented 1,799 birds of 67 species, excluding flyovers (Stantec 2015). No federally or state-listed T/E or SC species were detected. Forest edge habitat had the highest Shannon Diversity Index (SDI) values among survey points, while mixed forest habitat had the highest values among control points.

Eagle point count surveys from July 2013 to July 2014 did not detect any eagles, but 310 raptors of nine species were detected (Stantec 2015). Three state-listed threatened and SC species were found: eight Northern Harriers (state threatened), two Red-shouldered Hawks (state SC species), and six Sharp-shinned Hawks (state SC species).

2.2.5 Bat Literature Review Summary

2.2.5.1 Regional Bat Overview

This section discusses general bat ecology and habitat preference for bat species found in New York State. Very limited information specific to the Project Area was identified during the literature review. Nine species of bats have been identified as potentially utilizing the various landscapes found in the state of New York (see Table 2-7).

Table 2-7 Bat Species of New York and Preferred Habitats

Species	Federal Status	State Status	Preferred Habitats - Summer	Preferred Habitats – Winter
Big Brown Bat (*Eptesicus fuscus*)	-	-	Tree cavities, exfoliating bark, urban structures	Regional hibernacula, buildings, urban structure
Silver-haired Bat (*Lasionycteris noctivagans*)	-	-	Tree cavities, exfoliating bark in coniferous forested stands, and rock crevices	Migrates outside region
Eastern Red Bat (*Lasiurus borealis*)	-	-	Dense riparian tree foliage	Migrates outside region
Hoary Bat (*Lasiurus cinereus*)	-	-	Tree foliage	Migrates outside region
Eastern Small-footed Bat (*Myotis leibii*)	-	SC	Hemlock stands, rock crevices, tree bark, urban structures	Regional hibernacula, rock outcropping
Little Brown Bat (*Myotis lucifugus*)	-	-	Tree cavities, urban structures	Regional hibernacula
Indiana Bat (*Myotis sodalis*)	E	E	Exfoliating bark, cavities, dead trees in riparian corridors	Regional hibernacula
Northern Long-eared Bat (*Myotis septentrionalis*)	T	T	Tree cavities, exfoliating bark, barns, eves, shingles	Regional hibernacula
Tri-colored Bat[1] (*Perimyotis subflavus*)	in review	-	Tree foliage, leaf litter	Regional hibernacula

Source: Curtis and Sullivan 2001; NYSDEC 2016; Bat Conservation International 2016

Note:

1 In 2016, two non-profit organizations petitioned to have the tri-colored bat federally listed. The USFWS determined in December 2017 that a status review for this species is warranted, and a status review is still underway as of September 2019. The tri-colored bat currently has no federal protection or protection within the state of New York (Center for Biological Diversity and Defenders of Wildlife 2016*).

*As posted in the Federal Register on December 20, 2017, 82 FR 60362 (https://www.govinfo.gov/content/pkg/FR-2017-12-20/pdf/2017-27389.pdf).

Key:

E = endangered
T = threatened
SC = species of special concern

Habitats utilized by bats in New York include wetlands, agricultural and reverting fields, forests, and cities with a variety of micro-habitats used for foraging, roosting, and maternity roosting. Bats thrive in these various habitats as they are proficient predators of insect populations. Generally, bats are solitary outside of mating, hibernation periods, and rearing of young, although some colonial roosting does occur. The most common species of bats (e.g., little brown bat, big brown bat and eastern red bat) have adapted to a multitude of habitat types, including human-altered landscapes. As such, these species are assumed to utilize the Project

Area. The remaining bat species tend to be found only in densely forested stands and are not expected to be found regularly in the Project Area, if at all.

Specialized habitats required for bats include winter hibernacula, in which bat species congregate during hibernation periods (roughly November through March). Identified hibernacula include limestone caves, mines, and well shafts. Most bats require a moderated constant temperature and humidity provided by the hibernacula to survive over the winter. Measures have been taken by state and federal agencies in the last decade to protect important bat hibernacula habitats, as any disturbances during critical hibernation periods can be detrimental to large populations of bats, as well as individual bat species. Bats return in fall to established hibernacula. *Myotis* species in New York migrate relatively short distances to hibernacula each fall. Some bats winter in small hibernacula near their summer roosting areas, while other bats, specifically lasiurine bats, migrate farther south to warmer climates with greater availability of foraging resources.

Summer roosts are generally daytime or nighttime roosts, where bats will spend the entire day resting and/or portions of the night resting. Daytime roosts for New York bats can vary and include buildings, exfoliating bark, tree cavities, rock piles, and caves, depending on species-specific preferences. No roosting areas were identified in the Project Area during site visits or as indicated in the literature.

2.2.5.2 White-Nose Syndrome

In the last decade, an emerging disease known as white-nose syndrome (WNS) has caused more than 6 million bat deaths in the eastern United States and Canada. WNS was first discovered in New York State in the winter of 2006-2007. The fungus that causes the disease, *Pseudogymnoascus destructans*, has now been documented across 38 U.S. states and seven Canadian provinces (USFWS 2019). At hibernacula infected with WNS, mortality rates of 90 to 100% for *Myotis* species and the tri-colored bat is commonly observed (USFWS 2019). This rapid, widespread mortality has recently prompted the listing of the northern long-eared bat as threatened under the ESA. In total, 20 bat species, including five federally listed species, are affected by this disease or the fungus: the big brown bat (*Eptesicus fuscus*), cave bat (*Myotis velifer*), eastern red bat (*Lasiurus borealis*), eastern small-footed bat (*Myotis leibii*), gray bat (*Myotis grisescens*, endangered), Indiana bat (*Myotis sodalis*, endangered), little brown bat (*Myotis lucifugus*), long-legged bat (*Myotis volans*), Mexican free-tailed bat (*Tadarida brasiliensis*), northern long-eared bat (*Myotis septentrionalis*, threatened), Ozark big-eared bat (*Corynorhinus townsendii ingens*, endangered), Rafinesque's big-eared bat (*Corynorhinus rafinesquii*), silver-haired bat (*Lasionycteris noctivagans*), southeastern bat (*Myotis austroriparius*), Townsend's big-eared bat (*Corynorhinus townsendii*), tri-colored bat (*Perimyotis subflavus*), Virginia big-eared bat (*Corynorhinus townsendii virginianus*, endangered), western long-eared bat (*Myotis evotis*), western small-footed bat (*Myotis ciliolabrum*), and yuma bat (*Myotis yumanensis*) (USFWS 2019). Research into this disease, its long-term impacts on bat populations, and effective conservation strategies are extensive and ongoing.

As of August 2019, WNS has been documented in 20 counties in New York State, including a hibernaculum in Erie County that is approximately 50 miles (80 km) from the Project Area. WNS is presumed by the NYSDEC to occur throughout the state. During winter hibernacula surveys in 2011-2012, NYSDEC observed statewide declines of 98% for northern long-eared bats, 95% for tricolored bats, 90% for little brown bats, 71% for Indiana bats, and 13% for eastern small-footed bats, as compared with pre-WNS hibernacula survey data (NYSDEC 2012a).

2.2.5.3 Bat Studies in Proximity to the Project Area

Several bat studies were conducted at the Arkwright Summit Wind Project (originally named New Grange Wind Farm) and Cassadaga Wind Project, which are both in proximity to the Project Area. A summary of these bat studies are included in this section and provide additional local bat data for this region of New York.

Acoustical monitoring was conducted by WEST, Inc., at the proposed New Grange Wind Farm in the town of Arkwright, Chautauqua County, New York, in the spring, summer, and fall of 2007 (Kerns et al. 2008). Passive and active acoustical monitoring using Anabat bat detectors was conducted during 2007. In spring (April 26 to June 7, 2007), two Anabat detectors were used to passively sample a location near the radar station used for nocturnal bird surveys, and the other detector sampled at a meteorological (met) tower. Both units were deployed approximately 1 meter above ground level (AGL). In summer (June 8 to July 31, 2007) and fall (August 1 to October 29, 2007), passive sampling continued at the met tower; however, three Anabat detectors were simultaneously deployed at three separate heights: 1 meter, 25 meters, and 50 meters AGL. In addition to passive sampling, active handheld Anabat surveys were conducted to determine which bat species were present on-site. Each of these surveys were conducted over three, three-night sampling periods: June 20 to June 22, July 5 to July 7, and August 1 to August 3, 2007.

In total, 784 bat calls were recorded during the spring sampling period. The Anabat detector located near the radar station recorded higher bat activity (598 calls over 38 detector nights) than the met tower (186 calls over 34 detector-nights). In summer, a total of 254 calls were recorded, of which 65.7% (167 calls over 37 detector-nights) were recorded by the 1 meter AGL Anabat detector. Fifty-five calls were recorded by the 25 meter AGL Anabat detector over 35 detector-nights, and 32 calls were recorded by the 50 meter AGL Anabat detector over 18 detector-nights. In fall, the majority of bat calls were again recorded by the 1 meter AGL Anabat detector (311 calls over 76 detector-nights); however, this unit was operational on nearly two times more detector-nights relative to the 25 meter and 50 meter AGL Anabat detectors. The 25 meter AGL Anabat detector recorded 71 calls over 35 detector-nights, while the 50 meter AGL Anabat detector recorded 15 calls over 36 detector-nights. The majority of calls detected during passive sampling could not be identified with regard to species. Of the data that was identifiable to species, big brown bat was the most frequently detected species during

both the spring and fall sampling periods. During the summer sampling period, *Myotis* species calls, likely representing resident little brown bats, were the most frequently detected call sequences. Although infrequent, eastern red bats were detected during all three sampling periods, and hoary bats were detected infrequently during spring and summer. The tricolored bat was only detected during the fall sampling period (two call sequences).

During active sampling, 411 bat calls were recorded. Frequently detected species included eastern red bat, little brown bat, and big brown bat. Hoary bat was detected, but to a lesser extent than other species. No tricolored or silver-haired bats were detected. Calls of the Indiana bat, northern long-eared bat, and eastern small-footed bat are difficult to differentiate due to overlapping call characteristics; consequently, these bats were grouped into a single *Myotis* group and not identified to species. Kerns et al. (2008) concluded, based on their survey data and activity/mortality rates reported from other wind facilities, that mortality risks to bats would be lower at the New Grange project area than at other eastern wind facilities.

In 2015, WEST, Inc., conducted acoustical presence/absence surveys for the northern long-eared bat in compliance with the USFWS Summer Survey Guidelines in place at the time (Sichmeller et al. 2015; USFWS 2016). Acoustical surveys were completed at 35 sites for a total of 103 detector-nights between June 22 and August 16, 2015. Survey sites primarily consisted of forest edge and forest corridor habitats. In total, northern long-eared bats were documented as present at only one of the 35 survey sites. Follow-up mist-net surveys on the nights of August 11 and 12, 2015, did not detect this species at the survey site in which northern long-eared bats were documented as present during acoustic surveys.

Bat studies were also conducted in proximity to the Project Area as part of the permitting process for the Cassadaga Wind Project, also located in Chautauqua County, New York (Stantec 2015). In 2013, Stantec conducted passive acoustic bat surveys during the late summer and fall migration periods (i.e., August 14 to October 21). In 2014, the spring and fall surveys were completed (i.e., April 16 to October 15, 2014). In fall 2013, Stantec deployed two Anabat SD1 detectors at a met tower, with one detector microphone installed approximately 45 meters AGL and the other at 3 meters AGL. Stantec deployed a third detector at approximately 3 meters AGL in a tree adjacent to a stream where bat activity was expected. The tree detector was deployed in 2013 because the second met tower had not yet been constructed. In April 2014, Stantec deployed two more Anabat detectors on the second met tower on site, with similar deployment heights of 45 meters and 3 meters AGL.

Overall, the met detectors recorded 2,719 bat calls for a detection rate of 3.5 calls/detector-night. The tree detector recorded 52 bat calls for a detection rate of 0.8 calls/detector-night. In total, 2,771 bat calls were recorded by all detectors on site, for an overall detection rate of 3.3 calls/detector-night. The highest level of activity was recorded during August 2013 at the met tower 1 low microphone (n =

1,501 bat calls). The number of bat calls peaked at that microphone on 21 August (n = 599) and 22 August (n = 405), representing 36% of call sequences recorded by all five detectors throughout the 2013/2014 survey period. Across all met tower detectors, the big brown bat/silver-haired bat species group comprised 59% of all call recorded during the surveys (n = 1,595). Detectors recorded only 39 Myotis calls overall (1% of total calls recorded). Bat calls from unknown species represented 48% and 49% of bat calls recorded by the met 1 (n = 171) and met 2 high microphones (n = 149), respectively. Bat calls from unknown species represented the majority of calls (n = 42; 81%) recorded at the tree detector as well. Overall, at the Project, 73% of bat calls (n = 2,023) were recorded when mean nightly wind speeds were less than or equal to 6 meters per second (m/s), and 65% of bat calls (n = 1,809) were recorded when mean nightly temperatures were greater than 18 °C.

3 Tier 3 – Preconstruction Monitoring and Assessments

3.1 Avian and Bat Survey Results Summary

Various Tier 3 preconstruction surveys for wildlife and their habitat have taken place at the Project since fall 2006. Table 3-1 summarizes the type of surveys that have been conducted and the dates that the surveys were performed. The methodologies used for the Project field surveys can be found in the respective survey reports located in the 2008 Draft EIS, 2016 Supplemental Draft EIS, and 2016 Final EIS documents (E & E 2008, 2016a, 2016b). Information on the eagle use surveys and nest monitoring is included in the EMP in Appendix A

Table 3-1 Tier 3 Preconstruction Bird and Bat Surveys for the Project

Survey Type	Season/Year
Nocturnal Radar and Visual Survey	September 1 – October 15, 2006, April 15 – May 31, 2007
Raptor Migration Surveys	Fall 2006, Spring 2007, Spring 2008
Migratory Bird Surveys	May 2006, May 2007
Breeding Bird Surveys	June 2007, June 2008, June 2011, June 2016
Eagle Point-Count Surveys and Nest Monitoring	March 2012 – March 2013, March 2016 – February 2017
Bat Acoustical Monitoring	Fall 2006, Spring 2007 April – October 2012
Northern Long-eared Bat Occupancy Acoustical Monitoring	July – August 2015

3.1.1 Nocturnal Radar and Visual Study

Woodlot Alternatives, Inc. (Woodlot) conducted a nocturnal radar and visual study between September 1 and October 15, 2006, and between April 15 and May 31, 2007, to analyze the spring and fall nocturnal migration of birds and bats over the Project Area. The results of the study, including nocturnal radar passage rates, flight altitude, flight direction, and visual findings, are summarized in this section and provided in greater detail in the Supplemental Draft EIS (E & E 2008, Woodlot 2008a, Woodlot 2008b).

Nocturnal Radar

Passage Rates. Nocturnal radar observations indicate that passage rates in fall 2006 were 189 ± 21 targets/km/hr. Nocturnal passage rates were highly variable from night to night, ranging from 16 ± 3 to 604 ± 77 targets/km/hr. Nocturnal radar observations indicate that passage rates in spring 2007 were 419 ± 40 targets/km/hr. Nocturnal passage rates were highly variable from night to night, ranging from 22 ± 7 to 1,190 ± 94 targets/km/hr. Passage rates had some variation throughout the night during both the spring and fall studies – in both fall and spring, the lowest mean rates occurred during the first hour of sampling and near sunrise, whereas, the highest rates occurred near the third through fifth hour of sampling in the fall and the third through seventh hour of sampling in the spring. The overall mean passage rate of 189 targets/km/hr in fall was low to average compared to the 64 to 732 targets/km/hr documented during previous similar radar studies conducted in New York State. The spring passage rate of 419 targets/km/hr was higher than average but within the 41 to 509 targets/km/hr range documented during previous similar radar studies in the northeast.

Flight Altitude. The mean nocturnal flight altitude based on vertical radar sampling less than 4,921 feet (1,500) meters AGL in fall 2006 was 1,157 ± 39 feet (353 ± 12 meters) AGL, with a range among nights of 748 to 1,674 feet (228 to 510 meters) AGL. The mean nocturnal flight altitude based on vertical radar sampling less than 4,921 feet (1,500 meters) AGL in spring 2007 was 1,619 ± 93 feet (493 ± 28 meters) AGL, with a range among nights of 581 to 3,009 feet (177 to 917 meters) AGL. The spring and fall results are similar, and they are consistent with previous similar radar studies conducted in New York State (see E & E 2008) and existing literature regarding the flight of nocturnal migrants (Kerlinger 1989; Mabee et al. 2006a, 2006b; Smithsonian Migratory Center 2006). Similar radar studies conducted in New York State have shown ranges of mean flight altitudes from 1,093 to 2,178 feet (333 to 664 meters) in the fall and 955 to 1,998 feet (291 to 609 meters) in the spring. Mean flight altitudes were variable throughout the study periods. There was no significant pattern as to the timing of the lowest altitudes. Approximately 9% of all nocturnal targets in fall 2006 and approximately 3% of all nocturnal targets in spring 2007 flew below 394 feet (120 meters) AGL, a close approximation to the maximum turbine height. These percentages are consistent with similar radar studies conducted in New York State, which have documented a range of 2% to 13% of targets in the fall and 3% to 25% of targets in the spring flying below 410 feet (125 meters). The mean flight altitudes were 768 feet (235 meters) and 1,230 feet (375 meters) for fall 2006 and spring 2007, respectively, both of which are higher than the maximum turbine height (389 feet/118.5 meters); therefore, the majority of migration occurs well above the height of the pro-posed turbines.

Flight Direction. The mean flight direction of targets observed on radar was 216 degrees in fall and 9 degrees in spring. This indicates that the predominant flight

direction was southwesterly in fall and northerly in spring, which is consistent with the expected seasonal migration flight directions.

Nighttime Visual Study

Based on visual sampling via ceilometer observations to an approximate altitude of 394 feet (120 meters) AGL, a total of 31 birds and 12 bats were observed in the fall during 313 5-minute observations and four birds and 13 bats were observed in the spring during 157 5-minute observations.

Woodlot also calculated the percentage of birds and bats detected with the radar based on flight behavior. To distinguish birds from bats, flight behavior across the radar screen was noted where erratic flight behavior indicated bats and linear movement indicated either birds or bats. From this analysis, 95% of targets were birds, 3% were bats, and 2% were insects in the fall. In the spring, 96% of targets were birds, 2% were bats, and 2% were insects.

3.1.2 Migratory Raptor Surveys

Raptor migration areas in New York State are well documented, and the locations where large numbers (thousands to tens of thousands) of migrating raptors occur are already known. There are 13 sites in New York State that regularly report results to the Hawk Migration Association of North America (HMANA) database (HawkCount 2007). Most of these prime raptor migration locations are along the Great Lakes (in spring) and in the lower Hudson Valley (in fall). In spring, raptor migration is concentrated along the southern shores of the Great Lakes as raptors avoid crossing large bodies of water. Migratory raptors are also found in large concentrations along prominent ridgelines.

A raptor monitoring site (i.e., “hawk watch”) is located in Chautauqua County in the town of Ripley, approximately 24 miles (39 km) southwest of the Project Area, and another monitoring site is located near the Lake Erie shoreline in the town of Hamburg, in Erie County, approximately 23 miles (37 km) northwest of the Project Area; thousands of raptors are tallied at these sites each spring (Zalles and Bildstein 2000; HawkCount 2007). As the Project Area is not immediately proximate to the shorelines of the Great Lakes, large bodies of water, or lengthy ridgelines, raptor migration in the Project Area is diffuse and without regularly occurring concentration points.

There are no geographical or topographical features in the Project Area that attract or concentrate large numbers of migrating raptors. The closest is the Portage Escarpment, which is located adjacent to the northwest portion of the Project Area. Raptors concentrate along the lakeward side of this escarpment during the spring months as they migrate to their northern breeding areas. The concentration of raptors along the Portage Escarpment is greatest where the escarpment is closer to Lake Erie, such as near the Ripley Hawk Watch (approximately 2.5 miles [4 km] from the shore). The Portage Escarpment is located approximately 7 miles (11 km) from the shore in the vicinity of the Project Area.

Migratory raptor surveys were conducted in the Project Area during fall 2006, spring 2007, and spring 2008. Three surveys were conducted in fall 2006. During these three surveys, a total of 94 raptors of eight species were identified, 59 of which were considered to be migrants. The migratory passage rate was 2.8 raptors per observer hour. No regional hawk watches are conducted in the fall; therefore, no comparison could be made for the migratory passage rate between the Project Area and the regional hawk watches. Nine raptor surveys were conducted during the spring 2007 and spring 2008. A total of 671 raptors of 12 species were identified during these surveys, 332 of which were considered to be migrants (E & E 2008). The migratory passage rate was 5.3 raptors per observer hour. For comparison, counts conducted on the same nine days at two hawk watches located near Lake Erie had considerably higher concentrations of migratory raptors. At the Hamburg Hawk Watch, over the same nine survey days, 4,083 raptors were tallied, with a passage rate of 65.6 raptors/hour. At the Ripley Hawk Watch over the same nine survey days, 7,947 raptors were tallied, with a passage rate of 135.9 raptors/hour (HawkCount 2007, 2008).

The findings from the 2007 and 2008 spring migratory raptor surveys are consistent with the knowledge of spring raptor migration in New York State and the nearby studies conducted at the Arkwright Summit (formerly New Grange Wind Farm) Project Area, which had an overall passage rate of 4.4 raptors/hour (Kerns et al. 2008), as the birds concentrate in higher numbers along the Great Lakes and are relatively diffuse elsewhere. There is no evidence of a pronounced spring migratory raptor corridor in the Project Area.

3.1.3 Migratory Bird Surveys

Spring migratory bird surveys were conducted by E & E at 28 points in the Project Area on May 11 and 22, 2007, and at 33 points in the Project Area on May 6 and 16, 2008. A total of 1,624 birds of 90 species were identified in the 2007 surveys. The most numerous species recorded in 2007 were Red-winged Blackbird (261 birds), American Crow (125 birds) and Bobolink (99 birds). In 2008, a total of 1,603 birds of 75 species were identified. The most numerous species recorded in 2008 were Red-winged Blackbird (239 birds), American Crow (139 birds), and American Robin (135 birds). The species observed were all expected based on the habitat, location, and time of year, and the findings were consistent with the existing knowledge of the bird resources in the region (E & E 2008).

3.1.4 Breeding Bird Surveys

Breeding bird surveys were conducted at the site in 2007, 2008, 2011, and 2016. The first three years of surveys were conducted using a survey point placed at proposed wind turbine locations within the Project Area, whereas transects were surveyed in 2016. The survey points used in 2007 were visited on two occasions and surveys were 3 minutes in length. The survey points used in 2008 and 2011 were visited on one occasion for 5 minutes. The results of the first three years of surveys were consistent across years (see Table 3-2 for a comparison of the results).

Table 3-2 Breeding Bird Survey Results for 2007, 2008, and 2011 at Stationary Survey Points

	2007			
	6/11	6/26	2008	2011
Number of Survey Points	13	13	26	25
Number of Species Identified	56	60	72	66
Number of Birds	250	359	653	502
Average Species per Point	11.2	15.2	14.1	11
Average Birds per Point	19.2	27.6	25.1	20.8

Source: E & E 2011

The results of the breeding bird surveys in 2016 are not directly comparable to the results from previous years due to differences in survey methods. The total number of species detected was somewhat higher in 2016 (80 species) than previous years but comparable when including only birds within 164 feet (50 meters) of the transect (67 species). The two most common species detected during the 2016 breeding bird surveys were Bobolink and Red-winged Blackbird, which were the most abundant species detected in the 2011 surveys. The total number of birds detected in the 2016 surveys (1,954) and birds detected within 164 feet (50 meters) of the transect (962) were higher than in previous years. This observation is likely a result of the longer total survey time in 2016 compared to previous years.

The 2016 surveys were the most useful in associating bird activity with habitat. The transects in pasture/hayfield habitats had the highest number of birds, dominated by Bobolinks and Red-winged Blackbirds and, to a lesser extent, Savannah Sparrows and Song Sparrows. Forested habitats had higher species diversity, which was expected given the wider array of habitats within the forested transects.

No federally or state-listed threatened or endangered species were identified during the 2007, 2008, 2011, and 2016 breeding bird surveys; however, one Grasshopper Sparrow (New York State species of special concern) was detected during three of the surveys (2008, 2011, 2016). The locations included agricultural habitat dominated by tall grasses.

Overall, the findings from the breeding bird surveys are consistent with the existing knowledge of the bird resources in the region. Typical for Chautauqua County, a good diversity of breeding species is associated with the area, primarily in forested areas.

3.1.5 Bat Acoustical Monitoring

Spring 2007 Study

From March 28 to May 30, 2007, Woodlot deployed two Anabat bat detectors on a single met tower located in an agricultural field within the Project Area (E & E

2008; Woodlot 2008b). One Anabat microphone was mounted 66 feet (20 meters) AGL (henceforth "low mic") on the met tower, and the other was mounted 132 feet (40 m) AGL (henceforth "high mic"). In total, 86 detector-nights were sampled (32 detector-nights by the high mic and 54 detector-nights by the low mic). A total of 78 bat calls were recorded during this period, with a mean detection rate of 0.9 calls per detector-night for both detectors. A greater number of bat calls were recorded by the low mic (74 calls) versus the high mic (4 calls), but the low mic was operational for 22 more detector-nights overall. On nights when both detectors were functional, the low mic recorded more bat calls than the high mic. The number of calls recorded varied considerably from night to night, with most bat calls being recorded over a few nights in late April and early May. The maximum number of calls recorded by the low mic occurred on May 8 and 9, 2007, when 13 calls were recorded per night. The maximum number of calls (2 calls) recorded per night by the high mic occurred on May 15, 2007.

Nearly half (45%, or 35 calls) of the calls recorded during the spring surveys were classified as "unknown bat" due to poor call quality or limited call duration (i.e., too few pulses to identify). High frequency calls (i.e., greater than 35 kilohertz) comprised 94% (32 of the 35 calls) of the unknown bat calls, indicating that they likely originated from *Myotis* species or the eastern red/tricolored bat guild. Of the 43 call sequences that could be identified, approximately 60.5% (26 calls) were *Myotis* calls and 39.5% (17 calls) belonged to the big brown guild (which includes, big brown bat, silver-haired bat, and hoary bat). Three calls were identified to species level, including two big brown bat calls and one silver-haired bat call. *Myotis* species calls were not identified to species level due to overlapping call characteristics. It remains unknown if Indiana or northern long-eared bat calls were recorded during the spring 2007 acoustical surveys.

Fall 2007 Study

From July 30 to October 14, 2007, two Anabat detectors were again deployed at 66 feet (20 meters) and 132 feet (40 meters) AGL on the same met tower used during the spring 2007 study (E & E 2008; Stantec 2008). A total of 154 detector-nights were sampled (77 detector-nights per low and high mics), and 541 bat calls were recorded during this period. The combined mean detection rate for both detectors was 3.5 calls per detector-night. The low mic (295 calls) and high mic (246 calls) recorded a similar number of bat calls overall. The number of calls recorded per night varied, with the maximum number of calls recorded occurring on August 29, 2007 (22 calls) and September 21, 2007 (20 calls) for the high and low mics, respectively.

Over half (54%, or 291 calls) of the recorded calls were unidentifiable and labeled as "unknown bat" due to short call sequences, poor quality, or the presence of extraneous noise (e.g., static interference). Low-frequency bat calls, characteristic of the big brown guild, comprised the bulk of these "unknown bat" recordings (62%, or 85 calls) followed by high-frequency calls (38%, or 52 calls). Overall, 197 calls were identified to the big brown guild, 27 to the eastern red/tricolored bat guild, and 26 to the *Myotis* guild. Several calls were identifiable to the species level,

rather than guild. Five bat species were identified, including silver-haired bat (52 calls), hoary bat (30 calls), eastern red bat (19 calls), big brown bat (one call), and tricolored bat (one call). *Myotis* species calls were not identified to species level due to overlapping call characteristics. It remains unknown if Indiana or northern long-eared bat calls were recorded during the fall 2007 acoustical surveys.

Passive Bat Acoustical Study (2012)

In May 2011, NYSDEC suggested that an additional year of acoustical monitoring be conducted in effort to determine whether baseline bat activity rates have changed since 2007. From April 14 to October 25, 2012, two AnaBat SD1 bat detectors were installed by E & E biologists on a met tower within the Project Area. The detectors were deployed at approximately 16 feet (5 meters) AGL (low mic) and 132 feet (40 meters) AGL (high mic). In total, 196 detector-nights were sampled. The high detector was functional during all 196 detector-nights, although a few nights experienced some technical difficulties during which a small portion of the survey night may not have been recorded. The low detector was fully functional for 190 of 196 survey nights (96.9%). See the 2016 Supplemental Draft EIS for further explanation of sampling success (E & E 2016a).

A total of 4,530 bat calls were recorded during the survey period, with 2,243 (49.5%) of sufficient quality to be identified to low-frequency, mid-frequency, or *Myotis* species groups (E & E 2016a). The low-frequency species group included hoary bats, big brown bats, and silver-haired bats, while the mid-frequency species group included eastern red and tricolored bats. Bat calls identified to the *Myotis* species group included eastern small-footed bats, Indiana bats, little brown bats, and northern long-eared bats. The combined mean total activity for both detectors for the entire survey period was 11.7 bat passes per detector-night; the high mic averaged 6.9 bat passes per detector-night, and the low mic averaged 16.7 bat pass per detector-night. The period of highest total activity at the high mic was observed at the end of July through early August, whereas bat activity at the low mic peaked in early September.

Low-frequency bat calls comprised 59.6% (1,334 bat passes) of all identifiable bat passes. *Myotis* species (469 bat passes, or 20.9%) and mid-frequency bat calls (437 bat passes, or 19.5%) were less common. All three species groups—low-frequency, mid-frequency, and *Myotis* species bats—were recorded more often by the low mic than the high mic. The low mic averaged 5.1 low-frequency bat passes per detector-night, compared with 1.8 low-frequency bat passes per detector-night at the high mic. Mid-frequency bat activity was found to be only slightly higher at the low mic versus the high mic (1.3 vs. 1.0 bat passes per detector-night, respectively); and the *Myotis* species group was detected approximately 30 times more often by the low mic than the high mic (2.4 vs. 0.1 bat passes per detector-night, respectively).

In 2016, NYSDEC requested that E & E reanalyze previously collected acoustic data from 2012 survey season using two automated species identification software packages currently approved by the USFWS for presence/probable absence

surveys for the federally listed threatened northern long-eared bat. These software programs, or automated classifiers, included Bat Call Identification Version 2.7c (henceforth "BCID"; Bat Call Identification, Inc., Kansas City, Missouri) and Kaleidoscope Pro Version 3.1.8 (henceforth "Kaleidoscope"; Wildlife Acoustics, Inc., Maynard, Massachusetts). The Bats of North America (Version 3.1.0) extension was used as the classifier for Kaleidoscope, and a sensitivity setting of -1 "More Sensitive (Liberal)" was used, as required by the USFWS (USFWS 2016a). Default filter settings were used for both programs, with the exception of altering the number of minimum pulses for BCID identification from five pulses to two pulses. The species selected for possible identification were specified as big brown bat, eastern red bat, hoary bat, silver-haired bat, eastern small-footed bat, little brown bat, northern long-eared bat, and tricolored bat. Indiana bats were not included in this analysis for two reasons: (1) the Project Area is located outside of the known range for this species, so Indiana bats are unlikely to be recorded; and (2) this limited the possibility that either automated classifier would misidentify *Myotis* bat calls as Indiana bats, ultimately reducing false positives.

To assess the likelihood of presence of northern long-eared bats within the Project Area, E & E took a multi-level analysis approach that incorporated results from the automated classifiers, maximum likelihood estimations, and independent reviews from three E & E bat specialists with expertise in acoustic identification. This multi-level approach was used in order to prevent potential false-positive identifications. The visual review included a comparison of the bat call in question to a library of known northern long-eared bat calls. If either of the automated classifiers identified call files as northern long-eared bats, the panel of three E & E biologists independently reviewed these files. The total number of bat passes identified by BCID and Kaleidoscope, the p-values from the maximum likelihood estimation for presence calculated from each of the automated classifiers, and the consensus of visual confirmation from the E & E bat biologists was then summarized to determine the potential presence of northern long-eared bats within the Project.

For each night in which a northern long-eared bat was identified by the automated classifiers BCID or Kaleidoscope, presence was determined as "not likely," "possible," or "probable" based on a combination of factors, as outlined below:

- ***Not likely*** – no northern long-eared bat passes identified by either automated classifier; or northern long-eared bat passes identified by automated classifier programs were visually confirmed as another species by E & E biologists.
- ***Possible*** – at least one automated classifier program identified the call as a northern long-eared bat, and this was visually confirmed by E & E biologists.
- ***Probable*** – northern long-eared bat passes identified by both automated classifiers and confirmed visually by E & E biologists.

The automated classifiers suggested that northern long-eared bats were present on 29 detector nights between April 12 and October 25, 2012. In total, 23 call files

on 21 distinct nights were preliminarily identified as northern long-eared bat by BCID. Kaleidoscope identified 15 call files on 15 distinct nights as northern long-eared bats. Both software programs similarly identified seven calls as northern long-eared bats on seven distinct nights. In total, 31 call files originating from low detectors were preliminarily identified as northern long-eared bats by BCID and Kaleidoscope. Only two call files originating from high detectors were identified as northern long-eared bats, both by BCID.

The panel of E & E biologists independently reviewed all files identified as northern long-eared bats by either classifier program. A consensus on visual confirmation for northern long-eared bat was achieved on data from April 17, April 19, and September 2, 2012 and presence is "probable" for those three nights. Based on the previously defined presence determinations, presence of northern long-eared bat was also "possible" on three additional nights (June 11, August 7, and August 9, 2012). In total, 24 call files identified as northern long-eared bats by BCID or Kaleidoscope were determined by E & E biologists to be either vocalizations of another species (i.e., little brown bat call or eastern red bat feeding buzz) or of poor quality (i.e., too few pulses or fragmented) and incapable of being identified to a specific species. In total, six calls originating from the low mics were positively identified as northern long-eared bat, and no calls from this species were detected by the high mic during the 2012 survey year.

3.1.6 Northern Long-eared Bat Acoustical Occupancy Monitoring

In July 2015, an acoustical survey was initiated in response to the recent listing of the northern long-eared bat as threatened by the USFWS under the ESA. This species is also listed as threatened in New York State. Acoustic surveys followed the guidelines outlined in the USFWS Work Plan for Ball Hill, which was submitted to the USFWS on July 23, 2015 (E & E 2015) and was based on recommendations in the 2015 Range-Wide Indiana Bat Summer Survey Guidelines (USFWS 2015) applicable for northern long-eared bat presence/probable absence surveys for the 2015 field season. Over a three-week period, beginning on July 29 and concluding on August 19, 2015, Anabat bat detectors were installed at 49 sites or 99 detector locations (two detectors per site with three detectors at one site) within the Project Area and set to record for a minimum of two consecutive nights. Directional microphones, weatherproofed in a 45º angle PVC tube, were deployed approximately 1.5 meters AGL at each location. Throughout the Project Area, detectors were placed in habitat most likely to capture high-quality bat call sequences (e.g., forest openings, access roads, riparian corridors, and wooded edge habitat).

All recorded bat calls were analyzed using automated species identification software approved for use by the USFWS. BCID identified 17,515 total bat passes (2% of these were identified as unknown), with the majority (87%) identified as just three species: big brown bat (49%), silver-haired bat (27%), and eastern red bat (11%). According to BCID, hoary bats comprised 5% of the files, as did tri-colored bats (5%), and *Myotis* species composed less than 2% of the total bat activity. Kaleidoscope Pro identified 31,812 total bat passes overall (7% of these

were identified as unknown), with the majority (76%) identified as big brown bat (37%), eastern red bat (26%), silver-haired bat (13%), and hoary bat (12%). The remainder of the bat passes were little brown bat (3%), tricolored bat (1%), or either eastern small-footed bat or northern long-eared bat (1%) (E & E 2015).

Fourteen detector nights had significant maximum likelihood estimation (MLE) p-values for presence of northern long-eared bats (E & E 2015). For detector nights with significant MLE p-values, 10 call files were identified by BCID as northern long-eared bat at detector locations 7-B, 10-A, 15-B, 35-B, 38-B, 47-A, and 52-B. Kaleidoscope identified 46 call files as northern long-eared bat at detector locations 11-B, 38-B, 42-A, and 58-A. Both software programs agreed that northern long-eared bat calls were recorded at Site 38-B on August 12, 2015.

A panel of E & E biologists reviewed all files from detector locations where either program identified a file as northern long-eared bat with a significant p-value. A consensus on visual confirmation for northern long-eared bat was achieved at sites 38-B, 42-A, and 52-B. Based on the previously defined presence determinations, presence of northern long-eared bat was considered "possible" at two sites (survey points 42-A and 52-B) and "probable" at one other site (survey point 38-B).

3.2 Summary of Agency Consultations

The Project's consultation history is outlined below in chronological order by developer:

- 2006 - 2008. Noble sent letters describing the Project and requesting agency input on potential environmental concerns to the NYSDEC (through the Natural Heritage Trust) and USFWS. Meetings were held with NYSDEC and USFWS to discuss wildlife concerns. Noble conducted various wildlife surveys, including review of methods from NYSDEC and USFWS. NYSDEC provided comments on the Draft EIS.
- 2011 - 2013. Duke Environmental Power continued the agency coordination during its time as Project developer. Updated Natural Heritage Trust letters were obtained, multiple meetings were held with NYSDEC and USFWS to discuss wildlife concerns, and additional wildlife surveys were conducted following agency guidance or recommendations.
- 2015 - 2019. Ball Hill met with NYSDEC and USFWS in 2015 in an early stage of Ball Hill's involvement. Additional wildlife surveys were conducted following agency guidance or recommendations. Ball Hill met with NYSDEC and USFWS several times in 2015 - 2016 and obtained new Natural Heritage Program letters and the UFWS's online IPaC system, which identifies federally listed T/E species for a mapped area as well as wetlands and other fish and wildlife resources (see Section 3.2). Ball Hill received a permit from NYSDEC covering Articles 11 (state-listed species) and 24 (wetlands and waterbodies) in March 2019 that included a net conservation benefit plan

and providing mitigation through gating of the Jamesville Cave with the cooperation of NYSDEC.

In addition to the correspondence listed above, routine correspondence with NYSDEC and USFWS was maintained throughout the planning and implementation of the field surveys.

3.3 Review of WEG Tier 3 Questions

Question 1. Do field studies indicate that species of concern are present on or likely to use the proposed site?

Birds

No federally listed T/E bird species were detected during field studies at the Project Area.

During field surveys, two state-listed endangered species (Golden Eagle and Peregrine Falcon), two state-listed threatened species (Bald Eagle and Northern Harrier), and seven state species of special concern (Common Loon, Osprey, Sharp-shinned Hawk, Cooper's Hawk, Red-shouldered Hawk, Horned Lark, and Grasshopper Sparrow) were identified in the Project Area.

Information on site use by state-listed T/E and state species of special concern and those identified in literature review and agency correspondence is presented below in Table 3-3.

Bats

One federally threatened bat species, the northern long-eared bat (*M. septentrionalis*), was identified as present in low numbers in the Project Area during 2012 and 2015 bat acoustical surveys.

Question 2. Do field studies indicate potential for significant adverse impacts on the affected populations of species of habitat fragmentation concern?

The New York State Wildlife Action Plan (SWAP) lists five state-listed species of special concern as being sensitive to disturbance from turbines: Short-eared Owl, Horned Lark, Sedge Wren, Grasshopper Sparrow, and Henslow's Sparrow (NYSDEC 2015). The SWAP indicates that conservation threats to these species are more due to habitat loss than fragmentation. Only two of these five species were identified in the Project Area (Horned Lark and Grasshopper Sparrow), and sightings were infrequent and numbers low for both species. Significant adverse impacts are not anticipated.

Table 3-3 Special Status Bird Species Potentially Occurring in the Project Region

Species	Federal Status	State Status	NHP or USFWS Lists	Literature Review	Documented at the Project	Distribution	Site Use
Common Loon	-	SC	USFWS	CBC, eBird	X	Lakes, large ponds, reservoirs	Migrant
Pied-billed Grebe	-	T	USFWS	CBC, eBird	-	Lakes, large ponds, reservoirs	Possible breeder, migrant
Least Bittern	-	T	USFWS	BBS, eBird	-	Wetlands	Possible breeder, migrant
American Bittern	-	SC	USFWS	NYBBA, BBS, eBird, Arkwright	-	Wetlands	Possible breeder, migrant
Great Blue Heron	-	-	NHP	eBird	X	Wetlands, water bodies	Possible breeder (rookery 2 miles away), migrant
Black-crowned Night-Heron	-	-	USFWS	eBird	-	Wetlands, water bodies	
Osprey	-	SC	-	BBS, CBC, eBird, Arkwright, Cassadaga	X	Water bodies and adjacent woodland	Migrant
Golden Eagle	Eagle Act	E	-	Cassadaga	X	Open grassland	Migrant
Northern Harrier	-	T	NHP	NYBBA, BBS, CBC, eBird, Arkwright, Cassadaga	X	Open grassland	Possible breeder, migrant
Bald Eagle	Eagle Act	T	NHP	CBC, eBird, Arkwright, Cassadaga	X	Water bodies and adjacent woodland	Several nests in vicinity of Project; local flights; Migrant
Sharp-shinned Hawk	-	SC	-	NYBBA, BBS, CBC, eBird, Arkwright, Cassadaga	X	Woodland and edge habitat	Possible breeder, migrant
Cooper's Hawk	-	SC	-	NYBBA, BBS, CBC, eBird, Arkwright	X	Woodland and edge habitat	Possible breeder, migrant
Northern Goshawk	-	SC	-	NYBBA, BBS, CBC, eBird	-	Woodland and edge habitat	Possible breeder, migrant, and wintering resident

Table 3-3 Special Status Bird Species Potentially Occurring in the Project Region

Species	Federal Status	State Status	NHP or USFWS Lists	Literature Review	Documented at the Project	Distribution	Site Use
Red-shouldered Hawk	-	SC	-	NYBBA, BBS, CBC, eBird, Arkwright, Cassadaga	X	Woodland and edge habitat	Possible breeder, migrant
Upland Sandpiper	-	T	USFWS	NYBBA, BBS, eBird	-	Tall grassland	Possible breeder, migrant
Black Tern	-	E		eBird	-	Wetlands	Migrant
Common Tern	-	T	USFWS	eBird	-	Lakes, large ponds, reservoirs	Migrant
Black-billed Cuckoo	-	-	USFWS	eBird	-	Riparian and deciduous woodlands	Possible breeder, migrant
Short-eared Owl	-	E	NHP	CBC, eBird	-	Open grassland	Possible breeder, migrant
Red-headed Woodpecker	-	SC	NHP	NYBBA, BBS, CBC, eBird,	-	Open woodland	Possible breeder, migrant
Peregrine Falcon	-	E	NHP, USFWS	CBC, eBird	X	Open areas	Migrant
Olive-sided Flycatcher	-	-	USFWS	eBird, Arkwright	-	Woodland edge with snags	Migrant
Willow Flycatcher	-	-	USFWS	eBird	-	Riparian woodland with willows	Possible breeder, migrant
Horned Lark	-	SC	-	NYBBA, BBS, CBC, eBird	X	Bare ground, short grass fields	Possible breeder, migrant
Sedge Wren	-	T	NHP	NYBBA, BBS, eBird	-	Sedge marsh or wet grassland	Possible breeder, migrant
Wood Thrush	-	-	USFWS	eBird	-	Deciduous woodland	Possible breeder, migrant
Golden-winged Warbler	-	SC	USFWS	NYBBA, BBS, eBird	-	Woodlands, bogs	Possible breeder, migrant
Blue-winged Warbler	-	-	USFWS	eBird	-	Mature deciduous woodland	Possible breeder, migrant
Cerulean Warbler	-	SC		eBird, Arkwright	-	Mature woodlands	Possible breeder, migrant
Canada Warbler	-	-	USFWS	eBird	-	Woodland, forest	Possible breeder, migrant
Yellow-breasted Chat	-	SC	-	NYBBA, BBS	-	Riparian woodlands	Possible breeder, migrant
Grasshopper Sparrow	-	SC		NYBBA, BBS, eBird	X	Tall grassland	Possible breeder, migrant

Table 3-3 Special Status Bird Species Potentially Occurring in the Project Region

Species	Federal Status	State Status	NHP or USFWS Lists	Literature Review	Documented at the Project	Distribution	Site Use
Henslow's Sparrow	-	T	NHP	NYBBA, BBS, eBird	-	Tall grassland with thick litter layer	Possible breeder, migrant
Vesper Sparrow	-	SC	-	NYBBA, BBS, CBC, eBird	-	Grasslands	Possible breeder, migrant

Key:

BBS = U.S. Geological Survey Breeding Bird Survey.
CBC = Audubon's Christmas Bird Count.
E = Endangered.
Eagle Act = Bald and Golden Eagle Protection Act.
eBird = eBird global database by Cornell's Lab of Ornithology and Audubon
NHP = New York Natural Heritage Program
NYBBA = New York Breeding Bird Atlas
SC = Species of Special Concern.
T = Threatened.
USFWS = USFWS Information for Planning and Conservation (IPaC)

Question 3. What is the distribution, relative abundance, behavior, and site use of species of concern identified in Tiers 1 or 2, and to what extent do these factors expose these species to risk from the proposed project?

Birds

Raptor use in the Project Area is highest in the spring season when there is a greater raptor migration than fall due to regional geography. As the Project Area is not immediately proximate to the shorelines of the Great Lakes, large bodies of water, or lengthy ridgelines, raptor migration in the Project Area is diffuse and without regularly occurring concentration points. There are no geographical or topographical features within the Project Area that attract or concentrate large numbers of migrating raptors. The closest such feature is the Portage Escarpment, which is adjacent to the northwest portion of the Project Area. Raptors concentrate along the lakeward side of this escarpment as they migrate to their northern breeding areas. The concentration of raptors along the Portage Escarpment is greatest where the escarpment is closer to Lake Erie, such as near the Ripley Hawk Watch (approximately 2.5 miles (4 km) from the shore). The Portage Escarpment is located approximately 7 miles (11 km) from the shore in the vicinity of the Project Area.

The most numerous raptor species recorded during spring migration surveys were Turkey Vulture and Broad-winged Hawk, which are consistent with migration numbers and patterns in New York State. Red-tailed Hawk is the species with the highest year-round occurrence in the Project Area, with other raptor species present in lower numbers during some seasons or throughout the year: Northern Harrier, Osprey, Sharp-shinned Hawk, Cooper's Hawk, Northern Goshawk, Bald Eagle, Red-shouldered Hawk, Rough-legged Hawk, Merlin, American Kestrel, and Peregrine Falcon. Golden Eagle may rarely occur as a spring migrant. Black Vulture may also occur as a rare migrant, as evidenced by a few recent reports in eBird (2016) from near the Project Area (including one report within the proposed Project Area).

Very few waterfowl were documented during the various avian surveys. There are no large waterbodies or extensive wetlands with open water in the Project Area to attract significant numbers of waterbirds (i.e., waterfowl or shorebirds) during migration. Other than some small inland lakes and reservoirs (e.g., East Mud Lake, West Mud Lake, Silver Creek reservoir) that attract lesser numbers of migrant waterfowl in the general vicinity of the Project Area, Lake Flavia, a quarry reservoir in the town of Dayton, approximately 5 miles (8 km) east of the Project Area, occasionally attracts large numbers of waterfowl. Lake Erie, which is approximately 7 miles (11km) from the Project Area at the closest point, also attracts large numbers of migrant waterfowl. There is no strong passage of waterbirds in the Project Area, primarily because the habitat in the Project Area is unsuitable for large numbers of birds and the lack of large waterbodies in the Project Area.

Songbirds had the highest abundance and species richness during the various field surveys and in the literature review data. The nocturnal radar studies addressed nocturnal migratory songbird movements, with more songbirds recorded in spring than in fall. Unlike most migrating raptors, migrating passerines (i.e., songbirds) do not generally avoid crossing large bodies of water or migrate in concentrated numbers along ridgelines. However, they do concentrate in stopover sites following nocturnal migration. These stopover sites are often along geographical or topographical features, such as shorelines of large lakes or oceans, or isolated patches of habitat. No features that would attract or concentrate migrating passerines in greater numbers than elsewhere in the region were identified in the vicinity of the Project Area. As such, passerine migration in the Project Area is typically diffuse over a broad front, as in most of New York State. Given that the shortest distance from proposed turbine locations to Lake Erie is 7 miles (11 km), the Project Area is not anticipated to have increased numbers of stopover migrants.

Species that were found with higher abundance during the breeding bird and spring migratory surveys included Red-winged Blackbird, Bobolink, Savannah Sparrow, and Song Sparrow in the grasslands; Red-eyed Vireo, Hooded Warbler, and Gray Catbird in the forested areas; plus generalists such as American Crow and American Robin. Greater species richness was found in the forested areas during breeding bird surveys as compared to grasslands and other habitats.

Information on the distribution, relative abundance, and behavior of state-listed T/E and state species of special concern and their site use is summarized in Table 3-3.

For a further discussion of what risks these species may be exposed to by the proposed Project, refer to Question 4.

The EMP in Appendix A provides information on the eagle distribution, abundance, behavior, and site use. Results of the avian studies conducted at the Project Area are discussed in Section 3.1.

Bats

The northern long-eared bat is known to occur in Chautauqua County and was documented at the Project via acoustical surveys during 2012 and 2015. On April 2, 2015, northern long-eared bats were listed as threatened under the Endangered Species Act (USFWS 2015a). On January 14, 2016, the final 4(d) rule for northern long-eared bats was published by the USFWS, allowing for incidental take of this species in areas outside of the WNS zone when associated with most lawful activities, but as the WNS zone now (2019) covers the entirety of the NLEB range the 4(d) rule applies everywhere within the range. Section 4(d) of the ESA allows for the creation of special regulations for threatened species that replace normal protections of the ESA. Typically, 4(d) rules are established in order to reduce conflict between lawful human activities and protections provided to threatened species under the ESA. Species-specific 4(d) rules may either increase or decrease ESA protections, but will ultimately not slow the recovery of the threatened

species. Under the 4(d) rule for northern long-eared bats, tree removal within the Project Area is prohibited within a 0.25 mile (0.4 km) radius of known northern long-eared bat hibernacula any time of the year, or within a 150-foot (45-meter) radius from a known, occupied maternity roost tree during the pup season (June 1 through July 31). On April 25, 2016, the USFWS determined that establishing critical habitat was not prudent for northern long-eared bats, as their population decline is primarily associated with the spread of WNS and is not a direct result of habitat loss (USFWS 2016c). Nonetheless, the USFWS encourages habitat conservation for this species.

In the United States, the northern long-eared bat's range encompasses 37 states, ranging from Maine south to the Florida Panhandle in the east and from Montana south to eastern Kansas and eastern Oklahoma in the west (USFWS 2013b). Historically, this species was most frequently observed in the northeastern United States, including the entire state of New York (USFWS 2015f). This has changed in the last decade due to the onset and spread of WNS in North America. Prior to the arrival of WNS in 2006, New York contained greater than 500,000 northern long-eared bats (NYSDEC 2016). Recent winter hibernacula surveys throughout the state now indicate that only 2% of the population remain (. The USFWS considers the northern long-eared bat to be rare in locations in which three or more winter seasons of WNS have passed (USFWS 2015b). For example, Turner et al. (2011) observed a 98% decline in northern long-eared bat populations after two winter seasons of WNS exposure in 30 hibernacula in New York, Pennsylvania, Vermont, Virginia, and West Virginia. An analysis of 103 hibernacula across 11 states and one Canadian province found an average northern long-eared bat population decline of 96% post-WNS (USFWS 2015a).

Northern long-eared bats migrate seasonally between forested habitat used in summer months, and winter hibernacula, which are typically large caves or mines (Amelon and Burhans 2006). Suitable summer habitat consists of a wide variety of forested or wooded areas, and to a lesser extent, non-forested habitats, including riparian areas, wetlands, open water, roads, and edges of agricultural or pasture lands (van Zyll De Jong 1985; Amelon and Burhans 2006; USFWS 2015d). Summer habitat is generally variable and may include both contiguous forest and fragmented woodlots that possess variable amounts of canopy closure.

From April 12 to October 25, 2012, acoustical bat surveys were conducted at one met tower within the Project Area. In total, six northern long-eared bat calls (0.1% of total calls) were identified. Following the USFWS summer survey guidelines, presence/probable absence acoustical surveys for northern long-eared bats were also conducted from July 29 to August 19, 2015. In total, northern long-eared bats were considered present at three of 99 detector locations. Overall, these data indicate that this bat species is present within the Project Area, but likely in very low numbers.

Given the low numbers of northern long-eared bat calls detected during acoustical studies, no known hibernacula in the Project Area or maternity colonies in close

proximity to the Project Area, and the overall low number of *Myotis* bat species remaining within the state of New York due to WNS, the risk of incidental take for northern long-eared bats is relatively low. Additionally, other studies indicate that northern long-eared bats are rarely killed at wind energy sites and have been estimated to comprised less than 0.5% of all bat fatalities (Arnett and Baerwald 2013; Gruver and Bishop-Boros 2015). Pre- and post-WNS data indicate that, to date, only 43 northern long-eared bats have been discovered at operational wind energy facilities in North America (Gruver and Bishop-Boros 2015). Lastly, all northern long-eared bat calls were recorded by detectors below 66 feet (20 meters) AGL, indicating that this species infrequently utilizes airspaces at heights corresponding with the turbine's rotor-swept zone. Therefore, the potential risk of collision with spinning turbine blades for northern long-eared bats is likely low relative to other bat species found within the Project Area.

Question 4. What are the potential risks of adverse impacts of the proposed project to individuals and local populations of species of concern and their habitats?

The Project will not impact large, substantial patches of habitat for species of concern. Clearing of wooded vegetation for construction of the facilities will be necessary but is not expected to be significant. The most likely adverse impacts will be from collisions with wind turbines by birds and bats; however, mortality rates are anticipated to be within the range of other New York State wind facilities and significant adverse impacts are not anticipated.

Overall Birds

Bird fatality rates ranged from 0.66 to 15.50 birds/turbine/study period and from 0.44 to 6.20 birds/megawatt (MW)/study period at New York sites where recent, rigorous post-construction mortality monitoring has been conducted (see Table 3-4). Bird fatality rates in the Project Area are anticipated to be similar to those recorded elsewhere in New York State. This assumption is based on the habitat found in the Project Area, the lack of features in the Project Area that would suggest increased use, and the results of bird surveys and literature review.

It is anticipated that the bird fatality rates for the Project would be within the range of bird fatality rates presented in Table 3-4. The lower-bound estimate for the Project fatality rate was based on the results of the 2008 Noble Bliss three-day surveys (Jain et al. 2009e), and the upper-bound estimate was based on the results of the 2006 Maple Ridge Wind Project daily surveys (Jain et al. 2007). Based on these studies using a per turbine basis, the lower-bound estimate of bird fatalities is 24 birds per study period, and the upper-bound estimate of bird fatalities is 334 birds per study period. It is expected that the actual number of bird fatalities as a result of the Project would fall within these bounds. If approximations are based on 100 MW of the Project rather than the number of turbines, then the lower-bound estimate is 44 birds fatalities per period (based on Noble Bliss 2008 data [Jain et al. 2009e]), and the upper-bound estimate is 563 bird fatalities per period (based on Maple Ridge 2006 data [Jain et al. 2007]).

Table 3-4 Bird Fatality Rates from Post-Construction Studies Conducted at New York State Wind Energy Facilities

Wind Project and Location	Monitoring Start/End Date	Year	Reported Mortality Rate[1]		Reference
			Number of Bird Fatalities/ Turbine/ Period	Number of Bird Fatalities/ MW/Period	
Maple Ridge, Lewis County, New York – Mixed (agriculture and forest)					
Daily surveys	6/17 – 11/15	2006	9.29	5.63	Jain et al. 2007
3-day surveys	6/29 – 11/15	2006	4.47	2.71	Jain et al. 2007
Weekly surveys	7/11 – 11/13	2006	3.13	1.90	Jain et al. 2007
Weekly surveys	4/30 – 11/14	2007	3.87	2.34	Jain et al. 2009a
Weekly surveys	4/15 – 11/9	2008	3.42	2.07	Jain et al. 2009b
Weekly surveys	7/12 – 10/15	2012			
Noble Bliss, Wyoming County, New York – Mixed (agriculture and forest)					
Daily surveys	4/21 – 11/14	2008	4.30	2.86	Jain et al. 2009e
3-day surveys	5/9 – 11/14	2008	0.66	0.44	Jain et al. 2009e
Weekly surveys	5/9 – 11/14	2008	0.74	0.50	Jain et al. 2009e
Daily surveys	4/15 – 11/15	2009	4.45	2.97	Jain et al. 2009c
Weekly surveys	4/15 – 11/15	2009	2.87	1.91	Jain et al. 2009c
Noble Clinton, Clinton County, New York – Mixed (agriculture and forest)					
Daily surveys	4/26 – 10/13	2008	1.43	0.96	Jain et al. 2009d
3-day surveys	4/26 – 10/13	2008	3.26	2.17	Jain et al. 2009d
Weekly surveys	5/8 – 10/13	2008	2.48	1.65	Jain et al. 2009d
Daily surveys	4/15 – 11/15	2009	1.50	1.00	Jain et al. 2010b
Weekly surveys	4/15 – 11/15	2009	1.76	1.17	Jain et al. 2010b
Noble Ellenburg, Clinton County, New York – Mixed (agriculture and forest)					
Daily surveys	4/29 – 10/13	2008	2.09	1.40	Jain et al. 2009c
3-day surveys	4/28 – 10/13	2008	1.37	0.91	Jain et al. 2009c
Weekly surveys	4/28 – 10/13	2008	1.18	0.78	Jain et al. 2009c
Daily surveys	4/15 – 11/15	2009	5.69	3.79	Jain et al. 2010a
Weekly surveys	4/15 – 11/15	2009	2.29	1.53	Jain et al. 2010a
Cohocton and Dutch Hill, Steuben County, New York – Mixed (agriculture and forest)					
Daily surveys	7/15 – 9/17	2010	2.06	1.37	Stantec Consulting 2011
Weekly surveys	7/15 – 9/17	2010	1.16	0.77	Stantec Consulting 2011
Munnsville, Madison and Oneida Counties, New York – Mixed (agriculture and forest)					
Dog searches (recurrence unknown)	4/15 – 11/15	2008	1.71	1.14	Stantec Consulting 2009
Weekly surveys	4/15 – 11/15	2008	2.22	1.48	Stantec Consulting 2009
Noble Wethersfield, Wyoming County, New York – Mixed (agriculture and forest)					
Weekly surveys	4/26 – 10/15	2010	2.55	1.70	Jain et al. 2011a

Table 3-4 Bird Fatality Rates from Post-Construction Studies Conducted at New York State Wind Energy Facilities

Wind Project and Location	Monitoring Start/End Date	Year	Reported Mortality Rate[1]		Reference
			Number of Bird Fatalities/ Turbine/ Period	Number of Bird Fatalities/ MW/Period	
Noble Altona, Clinton County, New York – Mixed (agriculture and forest)					
Daily surveys	4/26 – 10/15	2010	2.76	1.84	Jain et al. 2011b
Weekly surveys	4/26 – 10/15	2010	1.55	1.04	Jain et al. 2011b
Daily Surveys		2011			
Noble Chateaugay, Franklin County, New York – Mixed (agriculture and forest)					
Weekly surveys	4/26 – 10/15	2010	2.48	1.65	Jain et al. 2011c
High Sheldon, Wyoming County, New York – Mixed (agriculture and forest)					
Daily and weekly surveys	4/15 – 11/15	2010	2.64	1.76	Tidhar et al. 2011a
Daily and weekly surveys	5/15 – 11/15	2011	2.36	1.57	Tidhar et al. 2011b
Howard, Steuben County, New York					
Daily and weekly surveys	4/13 – 11/16	2012	2.50	1.29	WEST 2012
Steel Winds I and II, Erie County, New York – Lakeshore (former industrial use)					
Weekly and bi-weekly	3/10 – 5/31 7/15 – 9/30	2012	7.15 – 8.46[2]	2.89 – 3.38	Stantec 2012
Weekly and bi-weekly	3/21 – 5/30 7/15 – 9/30	2013	6.92 – 15.50[3]	2.77 – 6.2	Stantec 2014
Marble River, New York					
		2014		1.67	Bay et al. 2015

Notes:
1 Adjusted for searcher efficiency and scavenger removal.
2 Stantec applied two different estimators for comparison; both are included here.
3 When gulls are removed from the analysis, the estimated rate is 6.29.

Bird Species of Concern

During field surveys, two state-listed endangered species (Golden Eagle and Peregrine Falcon), two state-listed threatened species (Bald Eagle and Northern Harrier), and seven state-listed special concern species (Common Loon, Osprey, Sharp-shinned Hawk, Cooper's Hawk, Red-shouldered Hawk, Horned Lark, and Grasshopper Sparrow) were observed in the Project Area. Generally, these species were observed in low numbers, and significant impacts on these species are not anticipated. The potential impacts on these species and the additional species listed by the USFWS and NYSDEC in the New York Natural Heritage Program (NHP) reports (i.e., Great Blue Heron, Short-eared Owl, Northern Harrier, Sedge Wren, Red-headed Woodpecker, and Henslow's Sparrow) within 10 miles (16 km) of the Project Area are discussed below. Bald Eagles are discussed in the EMP in Appendix A.

Golden Eagles

Two migrant Golden Eagles were observed in the Project Area by E & E staff during the spring raptor surveys conducted on March 30 and April 7, 2008, and

two migrant Golden Eagles were observed during the eagle surveys conducted on March 13 and 27, 2012. There are no active Golden Eagle nests in New York State, and the Project Area is outside of this species' breeding range. Golden Eagles are rare in winter in western New York as the wintering range for the eastern population is in the mid-Atlantic Highlands to the south (i.e., Pennsylvania and West Virginia). No activities pertinent to the life cycle of the Golden Eagle would regularly bring it to the Project Area except as a migrant or occasional transient. With such low utilization of the Project Area, the potential for direct mortality or injury of Golden Eagles resulting from collision with wind turbines is considered to be very low. Similarly, as breeding is not expected in the Project Area, the potential for harassment, displacement, or habitat impacts are also remote. Therefore, no potential significant adverse impacts on the Golden Eagle are anticipated.

Peregrine Falcon

One Peregrine Falcon was observed in the Project Area by E & E staff during the eagle surveys conducted on June 27, 2012. Peregrine Falcons can occur in the Project Area at any time throughout the year but are more likely during the fall and spring migrations. The potential for direct mortality or injury of Peregrine Falcons as a result of collisions with wind turbines is considered to be low, as they are not common to the Project Area and there are no potential nesting sites (e.g., cliff faces, tall buildings, or bridges) in the Project Area. The closest known nesting area is at Dunkirk Harbor, approximately 9 miles (14.5 km) from the Project Area. Therefore, no potential significant adverse impacts on the Peregrine Falcon are anticipated.

Northern Harrier

E & E staff observed Northern Harriers in the Project Area on several occasions during spring and fall raptor surveys, spring migratory surveys, and eagle surveys. This species breeds in Chautauqua County and is a regular occurrence in many areas of New York State. It is a confirmed or suspected breeder in or near the Project Area. The Northern Harrier is a ground-nesting raptor that uses various wetland and upland habitats, including cattail marshes, wet meadows, and hayfields for nesting. It is highly visible in all seasons and has a large hunting range (McGowan and Corwin 2008). Because there is ample suitable nesting habitat in and near the Project Area, the potential risk of displacement is low. Very few Northern Harrier fatalities resulting from collisions with wind turbines have been documented, even at sites that have relatively high use by this species (Erickson et al. 2002). This is likely due to Northern Harrier foraging behavior that is typically well below the rotor-swept zone. It is anticipated that local Northern Harriers would habituate to the presence of wind turbines; however, the collision risk is considered low to moderate because of the species' frequency of occurrence in the Project Area.

Short-eared Owl

The Short-eared Owl is listed by the NHP as occurring in the town of Sheridan in Chautauqua County. This location is assumed to be a wintering location rather

than a breeding area, because this species is a very rare breeder in western New York and no breeding has been documented in Chautauqua County (McGowan and Corwin 2008). This species is listed as endangered in New York State primarily because of its rare breeding status and decline in population. Although breeding Short-eared Owls are very rare in western New York, wintering Short-eared Owls occur with regularity. Suitable habitat occurs throughout much of Chautauqua County, including the Project Area, for wintering Short-eared Owls. Short-eared Owls have been observed in 11 out of 54 years during the Dunkirk-Fredonia CBC and 13 out of 77 years during the Jamestown CBC (Audubon n.d (a) and (b)). Although this species was not observed during field surveys, it is suspected that a few birds may forage in the Project Area during some winters. The potential impact on this species is anticipated to be low.

Sedge Wren

The Sedge Wren has been identified by the NHP as occurring in the town of Sheridan in Chautauqua County. Typical breeding habitat for this species consists of moist sedge meadows with grasses and scattered shrubs (McGowan and Corwin 2008). This elusive species is unpredictable, as it often does not reappear from year to year in the same breeding location. Habitat is often temporary and replaced over time by plant succession (McGowan and Corwin 2008). The Sedge Wren is secretive and spends most of its time near the ground, with limited flights just above the vegetation. The potential risk of turbine collision for this species is considered to be very low, and the potential risk of displacement is also considered to be very low because suitable habitat would not be altered.

Red-headed Woodpecker

The Red-headed Woodpecker has been identified by the NHP as occurring within 10 miles (16 km) of the Project Area. This species is an uncommon and declining inhabitant of western New York that prefers deciduous hard woods and open country with scattered trees. Their breeding habitat is present within the Project Area; however, their current distribution in western New York favors the immediate Lake Erie shoreline, and they are less likely to occur in higher elevations. While this species can potentially occur within the Project Area, the potential risk of turbine collision is considered low. Therefore, no potential significant adverse impacts on the Red-headed Woodpecker are anticipated.

Henslow's Sparrow

Henslow's Sparrow has been identified by the NHP as occurring in the town of Arkwright, Chautauqua County, approximately 6 miles (10 km) west of the Project Area. This rare and declining species has been identified in western New York only sparingly over the past decade. Typical breeding habitat consists of wet grasslands with tall, dense vegetation and thick litter (McGowan and Corwin 2008). Henslow's Sparrow is secretive, singing from inconspicuous perches on low forbs, shrubs, or grasses. Suitable habitat for this species would not be altered by construction or operation of this Project; therefore, the potential risks of turbine collision and displacement are considered to be very low. Therefore, no potential significant adverse impacts on the Henslow's Sparrow are anticipated.

Great Blue Heron

The Great Blue Heron has been identified by the NHP because a grouping of more than 50 nests per year (a heronry) has been documented at Dibble Hill/Farrington Hollow in the town of Arkwright, Chautauqua County, approximately 2 miles (3.2 km) west of the Project Area. While not a federally or state-listed endangered or threatened species, the Great Blue Heron is protected by the federal MBTA. The Great Blue Heron typically nests in colonies, usually near water, and is primarily a fish eater, wading along the shorelines of marshes, lakes, and rivers . There are numerous foraging areas near the heronry, including waterbodies within the Canadaway Creek Wildlife Management Area, Canadaway Creek and multiple tributaries, Black Pond, West Mud Lake, Fredonia Reservoir, Cassadaga Lake, and various other waterbodies.

There are relatively few creeks and ponds within the Project Area, although herons could traverse the Project Area if they wanted to forage at East Mud Lake, Silver Creek Reservoir, or the north branch of Conewango Creek, all of which are located east or northeast of the Project Area. Herons are not prone to collisions with wind turbines. In a review of bird collisions at wind facilities (Erickson et al. 2001) based on 31 studies, 78% of the carcasses found (outside of California) were passerines and only 3.3% were waterbirds (National Research Council 2007). The potential risks of collision and displacement of Great Blue Herons resulting from Project operation is considered low. Therefore, no potential significant adverse impacts on the Great Blue Heron are anticipated.

Other New York Avian Species of Special Concern

All of the species of special concern identified in the Project Area (Common Loon, Osprey, Sharp-shinned Hawk, Cooper's Hawk, Red-shouldered Hawk, Horned Lark, and Grasshopper Sparrow) were documented in low numbers. Of these seven species, Common Loon and Osprey do not breed in the Project Area, and the other five species may breed in low numbers in the Project Area. The potential risks of collision and displacement resulting from Project operation are considered to be low for each of these species. Therefore, no potential significant adverse impacts on these species are anticipated.

Bats

Migratory tree bats comprise the bulk of bat fatalities at operational wind energy facilities in North America. For example, Arnett and Baerwald (2013) estimate that between 650,000 and 1.3 million bats were killed by turbines in the United States and Canada between 2000 and 2011, of which three migratory tree bats (e.g., hoary bat, eastern red bat, and silver-haired bat) comprise approximately 78%. Conversely, *Myotis* species comprise a smaller proportion (6%) of wind energy fatalities (Arnett and Baerwald 2013). Within the Project Area, the majority of bat calls recorded originated from low-frequency bat species (big brown, hoary, and silver-haired bats), followed by mid-range frequency species (eastern red and tricolored bats), and lastly *Myotis* species. Low-frequency bat species also had the highest levels of activity within airspaces associated with the rotor-swept

zone (E & E 2013). Overall, based on acoustic data collected on site and elsewhere in New York, this Project may have the potential for moderate levels of bat mortality for hoary, silver-haired, eastern red, big brown, and tricolored bats. However, it has yet to be shown that preconstruction acoustic data can accurately predict post-construction fatality estimates (Hein et al. 2013). Only after the completion of post-construction mortality monitoring will empirical data be available to make this comparison.

Estimated bat fatality rates at wind energy facilities in New York are highly variable, ranging from 0.7 to 40.0 bats/turbine (0.46 to 16.3 bats/MW; see Table 3-5). Based on the acoustical monitoring data, bat activity peaks within the Project Area in late summer and fall (E & E 2013). Generally speaking, this is the timeframe in which bat fatalities occur at wind energy facilities in North America (Arnett and Baerwald 2013). Voluntary turbine curtailments are scheduled to occur at the Project during times of increased bat risk (i.e., July 1 to October 1), which will likely result in lower mortality rates than the sites previously studied in New York that did not employ similar operational reductions.

Table 3-5 Bat Fatality Rates from Post-Construction Studies Conducted at New York State Wind Energy Facilities

Wind Project and Location	Monitoring Start/End Date	Year	Reported Mortality Rate		Reference
			Number of Bat Fatalities/ Turbine	Number of Bat Fatalities/ MW/Period	
Maple Ridge, Lewis County, New York – Mixed (agriculture and forest)					
Daily surveys	6/17 – 11/15	2006	24.53	14.87	Jain et al. 2007
3-day surveys	6/29 – 11/15	2006	22.34	13.54	Jain et al. 2007
Weekly surveys	7/11 – 11/13	2006	15.20	9.21	Jain et al. 2007
Weekly surveys	4/30 – 11/14	2007	15.24	9.42	Jain et al. 2009a
Weekly surveys	4/15 – 11/9	2008	8.18	4.96	Jain et al. 2009b
Noble Bliss, Wyoming County, New York – Mixed (agriculture and forest)					
Daily surveys	4/21 – 11/14	2008	7.58	5.05	Jain et al. 2009e
3-day surveys	5/9 – 11/14	2008	14.66	9.78	Jain et al. 2009e
Weekly surveys	5/9 – 11/14	2008	13.01	8.67	Jain et al. 2009e
Daily surveys	4/15 – 11/15	2009	8.24	5.50	Jain et al. 2009c
Weekly surveys	4/15 – 11/15	2009	4.46	2.97	Jain et al. 2009c
Noble Clinton, Clinton County, New York – Mixed (agriculture and forest)					
Daily surveys	4/26 – 10/13	2008	5.45	3.63	Jain et al. 2009d
3-day surveys	4/26 – 10/13	2008	4.81	3.21	Jain et al. 2009d
Weekly surveys	5/8 – 10/13	2008	3.76	2.50	Jain et al. 2009d
Daily surveys	4/15 – 11/15	2009	9.72	6.48	Jain et al. 2010b
Weekly surveys	4/15 – 11/15	2009	5.16	3.44	Jain et al. 2010b
Noble Ellenburg, Clinton County, New York – Mixed (agriculture and forest)					
Daily surveys	4/29 – 10/13	2008	8.17	5.45	Jain et al. 2009c
3-day surveys	4/28 – 10/13	2008	6.94	4.63	Jain et al. 2009c
Weekly surveys	4/28 – 10/13	2008	4.19	2.79	Jain et al. 2009c
Daily surveys	4/15 – 11/15	2009	8.01	5.34	Jain et al. 2010a

Table 3-5 Bat Fatality Rates from Post-Construction Studies Conducted at New York State Wind Energy Facilities

Wind Project and Location	Monitoring Start/End Date	Year	Reported Mortality Rate		Reference
			Number of Bat Fatalities/ Turbine	Number of Bat Fatalities/ MW/Period	
Weekly surveys	4/15 – 11/15	2009	3.70	2.47	Jain et al. 2010a
Cohocton and Dutch Hill, Steuben County, New York – Mixed (agriculture and forest)					
Daily surveys	4/15 – 11/15	2009	40.00	16.00	Stantec Consulting 2011
Weekly surveys	4/15 – 11/15	2009	13.80	5.53	Stantec Consulting 2011
Munnsville, Madison and Oneida Counties, New York – Mixed (agriculture and forest)					
Dog searches (re-currence unknown)	4/15 – 11/15	2008	2.90	1.93	Stantec Consulting 2009
Weekly surveys	4/15 – 11/15	2008	0.70	0.46	Stantec Consulting 2009
Noble Wethersfield, Wyoming County, New York – Mixed (agriculture and forest)					
Weekly surveys	4/26 – 10/15	2010	24.45	16.30	Jain et al. 2011a
Noble Altona, Clinton County, New York – Mixed (agriculture and forest)					
Daily surveys	4/26 – 10/15	2010	6.51	4.34	Jain et al. 2011b
Weekly surveys	4/26 – 10/15	2010	3.87	2.58	Jain et al. 2011b
Noble Chateaugay, Franklin County, New York – Mixed (agriculture and forest)					
Weekly surveys	4/26 – 10/15	2010	3.66	2.44	Jain et al. 2011c
High Sheldon, Wyoming County, New York – Mixed (agriculture and forest)					
Daily and weekly surveys	4/15 – 11/15	2010	3.50	2.33	Tidhar et al. 2011a
Daily and weekly surveys	5/15 – 11/15	2011	2.67	1.78	Tidhar et al. 2011b
Howard, Steuben County, New York					
Daily and weekly surveys	4/13 – 11/16	2012	20.09	10.00	WEST 2012
Steel Winds I and II, Erie County, New York – Lakeshore (former industrial use)					
Weekly and bi-weekly	3/10 – 5/31 7/15 – 9/30	2012	6.88-13.01	2.75-2.54	Stantec 2012
Weekly and bi-weekly	3/21 – 5/30 7/15 – 9/30	2013	15.30	Not Reported	Stantec 2014
Marble River, New York					
		2014		0.71	Bay et al. 2015

Notes:
[1] A

Northern Long-eared Bats. The northern long-eared bat is the only federally listed species known to occur in the Project Area. This species was determined to be present via acoustical surveys during 2012 and 2015; however, relatively few calls were recorded overall, indicating that this species may occur on site in very low numbers. Overall, potential risk of collision with turbine blades does exist for this species, but current data from 182 wind energy facilities indicates that northern long-eared bats are infrequently killed by turbines at operational wind energy facilities in the northeastern United States (Gruver and Bishop-Boros 2015). Even

at wind sites where northern long-eared bats are considered common, fatalities for this species are rare (USFWS 2015b). In New York, the northern long-eared bat is no longer a common resident. Populations have declined by 98% since the arrival of WNS in the winter of 2006, and this bat species is now considered a rare summer resident in the state. Consequently, the fatality risk for northern long-eared bats from the Project is low. Additionally, adaptive, sitewide curtailment strategies, as described in Section 4.4, will further reduce the possibility of incidentally taking northern long-eared bats during operations.

During Project construction, forested habitat used by northern long-eared bats during summer months may be disturbed or removed; however, tree clearing will be kept to a minimum. In 2008, 67 wind turbines were planned to be built within the Project Area. After project delays and with the advancement of turbine technology during this time, taller turbines with greater energy capacities will now replace previously proposed turbine models. Consequently, only 29 turbines are planned to be constructed within the Project Area, which will ultimately limit the total amount of habitat disturbance. Seven turbines of 29 will be built in agricultural lands, with limited forest clearing and habitat modifications, though some clearing may take place to make room for turbine pads and/or access roads. Ultimately, the final design aims to keep habitat disturbance to a minimum in order to prevent long-term effects on northern long-eared bat populations.

Northern long-eared bats are interior forest bats that do not travel far from tree cover. Turbines at Ball Hill are sited away from forested areas to the extent practicable. Siting more turbines in agricultural fields minimizes risks to foraging northern long-eared bats and potential roosts.

Based on the guidelines, the species does not travel far from tree cover, approximately 1,000 feet (305 meters) maximum. However, given the generally even distribution of the habitat across the Project Area, it is anticipated that complete avoidance will not be possible, as some turbines will be placed within 1,000 feet (305 meters) of foraging habitat and will require some tree clearing for construction of the associated pads. However, turbines have been microsited to be located at the edge of wood lots to avoid large areas of tree clearing.

While this species, as with all bats in northern latitudes, migrate from hibernacula or points south in the spring, impacts on northern long-eared bats and bats in general during spring migration have been limited across the Midwest. Evidence on bat fatalities at wind farms suggest that the greatest risk of bats (including northern long-eared bat) being struck by turbine blades is during the fall months. Because some turbines will be placed within 1,000 feet (305 meters) of summer habitat, there is also some potential for northern long-eared bat fatalities during operation of the Project during the summer breeding season. However, because this species appears to be relatively uncommon in the Project Area and generally forages in forest interiors, the risk is likely low.

Indiana Bat. Given that Indiana bat populations drastically declined due to WNS, especially in the northeastern United States, and this species has not been documented to occur in western New York, it is unlikely that Indiana bats would be found residing in or migrating through the Project Area. Furthermore, the number of *Myotis* calls recorded by microphones located within the rotor-swept zone during surveys in 2007 and 2012 within the Project Area were relatively low (Woodlot 2008a; E & E 2013). Therefore, the fatality potential to this species is remote.

Eastern Small-footed Bat. The eastern small-footed bat has not been identified in the Project Area or in the vicinity, but there is potential bat habitat at the site (i.e., forested areas). The available data indicate that eastern small-footed bats tend to be low, erratic fliers, flying roughly 3 to 10 feet (1 to 3 meters) off the ground (Harvey et al. 1999). This suggests that these bats are less likely to fly in the rotor-swept zone than other bats. To date, only two eastern small-footed bat fatalities have been discovered at wind energy facilities in the United States (Gruver and Bishop-Boros 2015). Because of the potentially limited presence and flight tendencies of the eastern small-footed bat, collisions with wind turbines is not anticipated to occur.

Since eastern small-footed bats generally do not roost in trees, vegetation clearing as part of regular Project maintenance would have minimal impact on this species. A desktop review of the Project and site visits made as part of the Project's pre-construction environmental surveys did not identify any barren land or high elevation forested areas with rocky outcrops. However, if any talus piles or rocky outcrops in forested areas are discovered and disturbed during vegetation clearing or decommissioning activities, the potential exists for disturbance of eastern small-footed bat roosts, if present.

Eastern small-footed bats are not known to occur in the Project Area, and suitable roost habitat for this species does not appear to be present. However, if these bats are present and breeding, they would likely occur in very low numbers; thus, the potential for significant adverse impacts during operation would be minimal.

Question 5. How can developers mitigate identified significant adverse impacts?

Project design considerations, construction monitoring, operational measures, and best management practices have been developed based on the results from Tier 3 studies, information available in the WEG, and from other studies at wind energy facilities. These steps to avoid and reduce impacts are described in Section 4. Appendix A contains additional information in the EMP on measures proposed to avoid, minimize, and mitigate impacts on eagles.

Question 6. Are there studies that should be initiated at this stage that would be continued in either Tier 4 or Tier 5?

Ball Hill plans to conduct Tier 4, post-construction monitoring studies for the Project as detailed in Section 5.

4 Construction and Operation Phase Conservation Measures

4.1 Overview

The CMs discussed in this section were developed to address the potential impacts on bird and bat species identified based on the data collected during the initial desktop analyses (Tier 2) and preconstruction surveys (Tier 3). The CMs discussed in this section are divided into categories based on their time of application: design CMs, construction CMs, and operation CMs.

4.2 Project Design

Ball Hill expects to commence construction in fall 2019 with the Project fully operational no later than spring 2021. The Project is proposed to have a nameplate capacity of 100.5 MW of electricity using 29 turbines. Project features are shown in Figure 1. The following is a list of the permanent infrastructure that will be constructed as part of the Project:

- 29 turbines, rated at 3.45 MW, will be erected for a total energy generating capacity of roughly 100.5 MW. The 23 turbines in the town of Villenova will be up to 599 feet (183 meters) tall, and the 6 turbines in the town of Hanover will be up to 495 feet (151 meters) tall (tip height, or when a blade is completely vertical).
- Approximately 13 miles (21 km) of private access roads will be constructed to connect each wind turbine to a state or county roadway to allow equipment and vehicle access for construction and subsequent maintenance of the facilities.
- An electrical collection system will be constructed that will allow delivery of electricity to a substation to be built within the Project. Where practicable, the electrical collection system will be installed underground along the same right-of-way (ROW) corridor as the access roads. A total of approximately 24.8 (40 km) miles of underground collection line will be installed.
- A switchyard and substation will be constructed at the point of interconnection with the National Grid transmission system.
- An operations and maintenance building will be constructed with a footprint of 2.8 acres, requiring a 5-acre parcel to be leased.
- Project infrastructure was microsited to reduce wetland impacts.

4.2.1 Layout Considerations to Reduce Potential Impacts

The design and layout of the Project components were continuously evaluated and optimized to avoid or minimize adverse environmental impacts while improving Project efficiency. The Project layout was engineered to capture the area's high wind energy resource while minimizing wake effects on downwind turbines and adverse environmental impacts.

Through advancement of turbine technology, the Project footprint was reduced by utilizing larger and higher-capacity turbines than those proposed in 2008. The 2008 Project layout included 60 turbines and their associated access roads and collection lines. As currently designed, the current Project has a Project site encompassing up to 29 turbines and their associated access roads and collection lines.

Table 4-1 depicts a Project comparison between the Noble Ball Hill Windpark layout presented in the 2008 DEIS and Ball Hill's layout as presented in the 2019 Supplemental Draft EIS (RES 2019).

Table 4-1 Comparison of Project Layouts Proposed in the 2008 DEIS and the 2019 SDEIS

Project Component	2008 DEIS Layout	2019 SDEIS Layout
Wind Turbines (number)	60	29
Access Roads (miles)	16.0	13.0
Buried Electrical Collection Lines (miles)	23.8	24.8
Transmission Lines (miles)	6	0
Operations and Maintenance Building Site (acres)[1]	5	5
Substation (feet by feet)	200 x 300	200 x 300
Switchyard (feet by feet)	300 x 500	255 x 611
Temporary Construction Laydown Areas (acres)	28	10.4

Note:
[1] The Operations and Maintenance building site is currently proposed to be located within 10.4 acres of the laydown area following construction.

During the process of field-verifying the proposed turbine locations, access roads, electrical collection, and transmission line placement were also considered. In the interest of minimizing impacts, every effort was made to minimize the number of access road/collection systems needed. Each system was designed to:

- Co-locate electrical lines and roads within the same corridor, where possible;
- Optimize the use of previously disturbed areas, such as farmlands and roads; and
- Avoid or minimize wetland and stream crossings.

Once a route was selected based on these primary criteria, a secondary analysis was performed to determine whether the proposed route had any engineering constraints. Where avoidance of agricultural fields was not practicable due to other engineering and/or environmental constraints, appropriate placement of access roads, turbines, and the collection system was determined in order to minimize agricultural impacts. Access roads have been sited in accordance with New York State Department of Agriculture and Markets *Guidelines for Agricultural Mitigation for Windpower Projects* (NYSDAM 2008) wherever practicable to minimize loss of agricultural land and impacts on farming operations.

Each of the proposed turbines has been located outside of wetlands. The majority of impacts on wetlands and streams in the current proposed layout result from the need to cross wetlands and streams with access roads and/or collection lines. If the Project layout were to be modified to eliminate all impacts on wetlands, other impacts may occur, including increased cost, loss of potential turbines and generating capacity, and other adverse environmental impacts.

4.2.2 Avoidance and Minimization Measures through Project Design

As part of the Project's commitment to minimizing the potential impacts on bird and bat species during the construction and operation of the facility, the following CMs have been incorporated into the design of the Project:

- Tubular, non-lattice turbine towers (no external ladders or platforms) that are not attractive to birds for perching or nesting will be used.
- Larger and taller turbine design results in slower blade rotation, which reduces the collision probability for birds and bats passing through the rotor-swept zone.
- To the extent practicable, turbines, access roads, and other Project facilities were located in previously disturbed areas, and collection lines and access roads were co-located where possible to minimize habitat fragmentation.
- The minimum amount of lighting on wind turbines will be used to meet Federal Aviation Administration guidance. Blinking lights will be used as opposed to steady burning ones, and pilot warning lights will fire synchronously. This will minimize disorientation by nocturnal migrating birds.
- Motion- or heat-activated security lighting will be used at the Project operations and maintenance facility, substation, and other installations instead of lighting that would be left on throughout the night. If lighting is required to be on throughout the night, then lights will be pointed downward and shrouded.
- A proposed 5.7-mile (9-km) -long, 115-kV overhead transmission line and substation were eliminated and replaced with a 5-mile (8 km) extension of the Project's underground medium-voltage electrical collection circuits to the point of interconnection. This reduces impacts on wetlands and tree clearing,

in addition to reducing the collision and electrocution impacts on birds during operation of the Project.

- Transformers and conductors will follow guidance from the Avian Power Line Interaction Committee (APLIC 1994, 2006, 2012) to avoid and minimize risk of potential avian collisions and electrocutions.

4.3 Construction Conservation Measures

Ball Hill is committed to minimizing impacts on birds, bats, and their habitat during construction of the Project and will employ the following best management practices to the extent practicable:

- Minimize potential risk to maternity colonies of tree-roosting bats and tree-nesting birds (expected to be minimal):
  - Tree clearing will occur between November 1 and March 31, to the maximum extent practicable.
- Minimize impacts on nesting birds:
  - Clear vegetation and begin construction outside of preferred nesting season (see Table 4-2 for the timing of nesting for waterbirds, raptors, and songbirds); or
  - If construction must take place during breeding season, manipulate (e.g., clear, mow) vegetation prior to the nesting season to discourage nesting in the Project; or
  - If clearing must take place within the breeding season, conduct a preconstruction nest survey of the Project Area, establish buffer zones around active nests, monitor active nests, and avoid nests and buffer zone until young have fledged (this would result in a delay in clearing and construction in the nest buffer area);
  - Alternatively, nests may be removed and/or relocated, which will require USFWS and NYSDEC coordination.
- Maintain speeds of no greater than 20 miles per hour (mph) on Project roads to minimize wildlife collisions. On existing roads, maintain no greater than the posted speed limit.
- Ball Hill will instruct Project personnel to be alert for wildlife, to use additional caution while driving in low-visibility conditions, to restrict travel to established travel routes and work areas, and provide instruction to staff on what to do when dead or injured wildlife is encountered.
- Site-specific environmental and wildlife information will be included in the site safety orientation given to all site employees before they can work on the Project.
- Down-shield any construction lighting used at night to the extent practicable and in consideration of worker safety and security.
- Implement a stormwater management plan to avoid sedimentation and erosion of water resources from construction activities.

Table 4-2 Nesting Periods for Breeding Bird Species for the Project Region

Species Group	Average Nesting Period
Waterbirds (i.e., wading birds, waterfowl, and shorebirds)	March – early August
Raptors and Owls	April – June (nesting may start as early as January for eagles and some owl species)
Songbirds and Allies (order Passeriformes)	April – early August

4.4 Operation Conservation Measures

Once operational, Ball Hill will implement a series of CMs in order to minimize impacts on bats, birds, and their habitat for the operational life of the Project.

A turbine curtailment strategy will be implemented at the Project to reduce potential direct mortality to the federally threatened northern long-eared bat during the fall migration season. Under this conservation measure, all turbines at the Project will be feathered and non-operational from July 1 to October 1 (i.e., the fall migration season) during all nighttime hours in which wind speeds are less than or equal to 5.0 meters per second (m/s) (11.2 mph) and ambient temperatures are greater than 10°C (50°F). For the remainder of the bat activity season, April 1 to June 30 and October 1 to November 15, turbines will be feathered below the manufacturer's cut-in speed when ambient temperatures are greater than 10ºC (50°F). From November 16 to March 31 (i.e., bat inactivity or hibernation period), turbines will operate without limitations at the Project.

At other operational wind energy facilities in North America, a 5.0 m/s cut-in speed reduced bat fatalities by 60% on average (range: 47% to 82%; Arnett et al. 2010; Arnett et al. 2013; Young et al. 2013; Hein et al. 2014; USFWS 2014). In Indiana, a 5.0 m/s cut-in speed at the Fowler Ridge Wind Energy facility reduced bat fatalities by 50% overall (Good et al. 2011). At the Criterion Wind Energy Facility in Maryland, Young et al. (2013) observed that a 5.0 m/s cut-in speed reduced total bat fatalities by 62% when implemented between July 15 and October 15, 2012. At the Casselman Wind Energy Facility in Pennsylvania, Arnett et al. (2011) observed that the total bat fatalities at turbines with increased cut-in speeds (i.e., raised from 3.5 m/s to 5.0 m/s and 6.5 m/s) were estimated to be 82% less in 2008 (95% CI: 52 – 93%), and 72% less in 2009 (95% CI: 44 - 86%) than fully operational turbines. In other words, total bat fatalities at fully operational turbines were estimated to be 5.4 and 3.6 times greater on average than at curtailed turbines in 2008 and 2009, respectively. Lastly, curtailing turbines below the manufacture's cut-in speed at the Project for the remainder of the bat activity season will likely reduce bat fatality rates by at least 30% overall. In Indiana, Good et al. (2011) observed a 36% reduction in bat fatalities when turbines were

feathered below 3.5 m/s between July 15 and October 31, 2011. In West Virginia, Stantec (2013) observed similar results, a 35% reduction in bat fatalities turbines feathered below 3.5 m/s from August 15 to October 31, 2011.

When focusing simply on *Myotis* species, a 5.0 m/s cut-in speed will like decrease fatality rates by at least 90%. For example, Gruver and Bishop-Boros (2015) synthesized pre-WNS mortality data from 182 studies at operational wind energy facilities in North America and determined that fatality reductions for *Myotis* bats ranged from 92.8% to 94.4% when turbine cut-in speeds were between 4.0 m/s and 4.5 m/s. Therefore, it is reasonable to assume that an increase from 4.0 or 4.5 m/s cut-in speeds to 5.0 m/s will result in even greater fatality reductions for *Myotis* bats at the Project. Overall, northern long-eared bats are rarely killed at operational wind energy facilities in North America (Arnett and Baerwald 2013; Gruver and Bishop-Boros 2015), and with the implementation of this conservation measure during the timeframe of greatest risk for bats (i.e., fall migration), it is likely that bat fatality rates will decrease by at least 60% at the Project, and potentially by greater than 90% for *Myotis* species, which includes the federally threatened northern long-eared bat.

It is uncertain how the above conservation measure will impact birds. Theoretically, this curtailment strategy should provide some fatality reduction for bird species, as the turbines will be operational less often during the fall migration season. Several other conservation measures that will reduce impacts on birds are described below:

- Remove large animal carcasses from the Project that may attract carrion-eating raptors such as eagles and turkey vultures. Communicate with local hunters and request that they do not leave deer gut piles within the Project Area.
- Remove unnecessary structures within the Project Area that may serve as suitable perches for raptors.
- When feasible, use motion- or heat-activated security lighting at the Project instead of lighting that would be left on throughout the night. If lighting is required to be on throughout the night, the lights will be pointed downward and shrouded to the extent practicable and in consideration of worker safety and security. This will reduce the likelihood that lighting will attract migrating birds to the Project Area and, subsequently, may reduce avian fatality rates.
- Maintain speeds of less than 20 mph on Project roads to minimize wildlife collisions. On existing roads, maintain the posted speed limit.
- Implement a Wildlife Incident Reporting System (WIRS). Refer to Section 5.5 for a description of the WIRS.
- Conduct annual on-site training for all Project operation and maintenance staff on T/E species identification and the Bird and Bat Reporting System protocol.

- Include measures to reduce the risk of wildfire (e.g., smoking in designated areas, avoid parking vehicles over dry vegetation, etc.) and provide a plan of action in case of a wildfire in the site operation plan.

4.5 Adaptive Management

Adaptive management is an iterative process that implements flexible decision-making as new information or outcomes resulting from Project operations or management actions become better understood.

The project design avoided, minimized, and reduced potential impacts on sensitive resources to the extent practicable by planning the Project's development according to the USFWS's tiered approach described in the *Land-Based Wind Energy Guidelines* (USFWS 2012a), including the completion of an initial evaluation and site characterization (Tiers 1 and 2) and preconstruction field surveys (Tier 3). Based on this systematic approach to evaluating bird and bat resources, the proposed Project, as designed, is not expected to have substantial impacts on birds or bats; however, an adaptive management framework for the Project is established here in case Tier 4 and Tier 5 post-construction surveys suggest otherwise.

To evaluate the actual impacts the operational Project has on bird and bat resources, Ball Hill has committed to conducting post-construction mortality monitoring at the Project. The results from these efforts will be provided to the USFWS and NYSDEC following study completion, and the Project will consult with these agencies about the implementation of adaptive management procedures that may be needed based upon newly obtained data. At the Project, any adaptive management strategy will be specifically tailored to an identified problem (e.g., a specific species, location, season, or combination of the three), and will incorporate a robust, treatment-based experimental design to assess the cause-and-effect relationships related to the identified problem. The Project will engage the USFWS and NYSDEC during the development of any adaptive management strategy and rely on their feedback and the best available science to improve the process. Specific adaptive management or operational minimization measures could include, but are not limited to, the following:

- Modify the current plan for turbine cut-in speeds during high-risk timeframes for bats (i.e., fall migration);
- Curtail specific "high-risk" turbines for birds or bats during defined seasons or time periods, as necessary, and if protected species are likely to be present;
- Install anti-perching, anti-nesting, or electrocution protection devices on Project infrastructure that is attractive to birds;
- Remove large carcasses from Project so as to avoid attracting carrion-eating raptors such as eagles and vultures;
- Remove inactive raptor nests from power lines/other structures, as necessary, with written approval from the USFWS; and

- Contribute to a wind/wildlife research fund or provide funds and access to a university, agency, or consultant to conduct research regarding wind/wildlife interactions at the Project.

Adaptive management measures will be considered so as to further avoid, minimize, or compensate for unanticipated and significant impacts on wildlife from the Project. Thresholds for considering an adaptive response will include the following:

- Mortality of an eagle (see more details in EMP), northern long-eared bat, or species listed as endangered/threatened under the Endangered Species Act; or
- Significant levels of mortality of unlisted species of birds or bats. Significance will be determined by qualified biologists and will be based on the latest information available, including the most recent data on species' status, population size, and current population trends; or
- Changes in the federal or state status of wildlife species occurring in the vicinity of the Project.

If the impacts observed in the first year of mortality monitoring represent a significant impact on wildlife, adjustments will be made prior to the second year of post-construction surveys so as to tailor additional data collection efforts towards specific, applicable information needed for the implementation of an effective adaptive management strategy. The Project will implement this adaptive management process in coordination with the USFWS and NYSDEC and may seek an eagle take permit or incidental take permit if the results of this adaptive management process suggest that is an appropriate next step. Lastly, any adaptive management or operational minimization measures proposed or implemented on the Project will consider and accommodate recommended best management practices for Project infrastructure and will be consistent with site safety standards.

5 Tier 4 - Post-Construction Monitoring

5.1 Tier 4 Overview

Tier 4 of the WEG (USFWS 2012a) includes post-construction mortality monitoring in which ground-based surveys are conducted in order to gather data on direct impacts on birds and bats from Project operations. This data is used to determine whether preconstruction risk assessments for birds and bats were correct and whether an adaptive management strategy needs to be implemented if, in fact, the Project has greater impacts than originally predicted. Specific questions to be answered during Tier 4 post-construction mortality monitoring, as outlined in the WEG (USFWS 2012a), include the following:

1. What are the bird and bat fatality rates for the project?
2. What are the fatality rates of species of concern?
3. How do the estimated fatality rates compare to the predicted fatality rates?
4. Do bird and bat fatalities vary within the project site in relation to site characteristics?
5. How do the fatality rates compare to the fatality rates from existing projects in similar landscapes with similar species composition and use?
6. What is the composition of fatalities in relation to migrating and resident birds and bats at the site?
7. Do fatality data suggest the need for measures to reduce impacts?

Following the collection and analysis of Tier 4 post-construction mortality monitoring data, Ball Hill will work with the USFWS and NYSDEC to determine what the next steps will be and whether additional monitoring or mitigation measures are needed to reduce impacts on birds and bats at the Project.

Post-construction monitoring will be conducted in accordance with the NYSDEC permit conditions:

Post-construction wildlife monitoring will be conducted and include direct impact fatality studies, habituation/avoidance studies, and breeding bird surveys. A Post Construction Avian and Bat Monitoring and Adaptive Management Plan shall be

developed. The details of the post-construction studies (i.e., the start date, number and frequency of turbine searches, search area, bat monitoring, duration and scope of monitoring, methods for observational surveys, reporting requirements etc.), will be described in the Post-construction Avian and Bat Monitoring and Adaptive Management Plan and based in part on NYSDEC's June 2016 Guidelines for Conducting Bird and Bat Studies at Commercial Wind Energy Projects. The Guidelines will be adapted as needed to design a work plan for surveys capable of adequately detection rare events and impacts to listed species. The work plan will be developed through consultation between the permit holder, USFWS, and NYSDEC, and a final plan will be approved by NYSDEC and be in place prior to the start of project operation. As the Project will be permitted to directly or indirectly impact state-listed threatened and endangered species, post-construction monitoring must be properly designed to evaluate mortality and displacement impacts, and monitoring will occur at intervals as stipulated and agreed upon in the aforesaid mentioned plan, over the life of the Project.

5.2 Avian and Bat Fatality Monitoring

Two years of post-construction monitoring by trained biologists will be implemented to monitor and evaluate the Project's impacts on birds and bats. The results of the post-construction monitoring will facilitate discussions regarding whether additional surveys are necessary and/or whether adjustments to facility operations and management are appropriate. Post-construction mortality monitoring data will guide the adaptive management process.

To meet the recommendations of the USFWS *Land-Based Wind Energy Guidelines* (USFWS 2012a) and NYSDEC's *Guidelines for Conducting Bird and Bat Studies at Commercial Wind Energy Projects* (NYSDEC 2016), post-construction mortality surveys will be completed between April 15 and November 15 for two years following construction to evaluate the overall impacts of Project operations on birds and bats. This duration includes both the spring and fall migration periods for birds and bats, which are the anticipated periods of greatest risk to birds and bats from Project operations.

Mortality searches will be conducted by biologists trained in bird and bat identification. Turbines that will be included in the search will be selected randomly but may be adjusted to ensure that all available habitat types present within the Project are represented in the study. Search style and plot size will be coordinated with NYSDEC during study design. Ball anticipates that full plots will be searched during the first year of monitoring, and based on results from these data (e.g., number of bird and bat carcasses, species composition of carcasses), searches of roads and pads may be suitable for subsequent years. Ball Hill will discuss this possibility with NYSDEC and USFWS following the first year of mortality monitoring at the Project.

During each mortality survey, the observer will record the start/end time, observer name, turbine identification number, ground cover data, and weather data. Each bird or bat carcass that is found during the survey will be marked by a pin flag so

that the carcass can be revisited upon completion of the survey to collect carcass-specific data. Data collected for each carcass will include species, sex, and age (when possible), estimated time since death, condition of carcass (e.g., entire, partial, scavenged), carcass position, ground cover type in which the carcass was found, and location using a global positioning system unit (NYSDEC 2016). All detected carcasses will be photographed, making sure to document position of the carcass, ground cover, and any characteristics useful for species and sex identification. Fatalities that cannot be identified will be recorded as an unidentified bat or bird. For incidental carcasses (i.e., birds or bats found outside of standardized searches or search plot), as much of the above information will be collected, including photographs, and datasheets will indicate that the carcass was found incidentally.

Contingent upon approval by and receipt of a permit from NYSDEC (Scientific Collector's Permit) and the USFWS (Special Purpose Salvage Permit for Utilities-Wind [2127 Permit] and a federal recovery permit in case T/E species handling becomes necessary), it is recommended that carcasses collected on site during standardized searches be used in searcher efficiency and carcass persistence trials. If an inadequate number of carcasses are found during standardized searches or NYSDEC and USFWS permits cannot be obtained, a surrogate carcass may be used (e.g., mice, non-MBTA birds). If the carcass of a federally or state-listed T/E species is discovered during the mortality study, Ball Hill will report the incident to USFWS and NYSDEC within 24 hours of the discovery following the conditions of the NYSDEC permit. The methodology of reporting such incidents will be determined through discussion with the respective agencies.

As part of the mortality study, the searcher efficiency rate (i.e., the ability of a surveyor to detect a mortality) and carcass persistence rate (i.e., the average time that a carcass persists or is removed by scavengers before it is rendered unobservable) will be determined for bats and birds. Searcher efficiency and carcass persistence trials will be conducted seasonally (i.e., spring, summer, fall) to ensure that temporal differences in searcher efficiency and carcass persistence are documented. The number of trials will be determined based on the statistical model used. Calculating searcher efficiency and carcass persistence rates will allow for adjustment to raw mortality data and a refined and a more accurate mortality estimate. The mortality estimator that will be used to calculate the adjusted mortality rate will be determined based on the carcass persistence rate during each search interval. The Project will also consider the use of any additional estimators that are developed and vetted in peered-reviewed literature.

The results of the mortality study will be presented to USFWS and NYSDEC following completion of the one-year study.

5.3 Incidental Monitoring

5.3.1 Training of On-Site Staff

Ball Hill will annually educate all operations personnel about wildlife laws, reporting requirements, and permit requirements, with specific emphasis on special status species that could occur in the Project. Operations personnel will be trained to identify potential wildlife conflicts and the proper response. An incidental reporting process will be developed for operations personnel to ensure they can document bird or bat casualties during routine maintenance work and at other times that they are within the Project.

In addition to incidental fatality reporting, operations personnel will be trained to identify Bald and Golden Eagles, and Northern Harrier, Short-eared Owl, and Upland Sandpiper as per the NYSDEC permit conditions. Staff will also be sensitive to relative eagle use rates, and look for eagle casualties while driving between turbines and conducting turbine maintenance. More information on eagle monitoring throughout the life of the Project can be found in Appendix A.

5.3.2 Injured Wildlife Handling and Reporting Protocol

Any injured wildlife observed during operation of the Project will be left in place until Ball Hill's primary biological/ecological representative has been contacted. Ball Hill will then decide the most appropriate course of action depending on the condition and species of the injured animal discovered. All injured raptors, waterfowl, waterbirds, federally or state-listed bird species, and federally or state-listed bats will be promptly delivered to the appropriate rehabilitation center or other approved facility as specified in state and federal permits or as directed by necessary law enforcement personnel. All injured non-protected bird and bat species will be humanely euthanized on site.

Appropriate wildlife salvage/collection permits will be sought from NYSDEC and the USFWS. Dissemination of data (e.g., to the USFWS Special Agent and other agency representatives) will be completed following the permits, if provided.

The contact information for Ball Hill's primary biological/ecological representative is included in Section 7.3.

5.3.3 Post-Construction Results and Recommendations Reporting Protocol

Ball Hill will prepare an annual report summarizing the results of the monitoring and assessment completed as described in Sections 5.2 and 5.3.

Specific to the formal avian and bat fatality monitoring, the report will include turbine-specific information on found carcasses along with estimated fatality rates for birds and bats. Fatality estimates will be calculated for bats and birds. Estimated fatality rates will be calculated using the total number of carcasses found along with data from searcher efficiency and carcass removal trials. The report will include an analysis that provides a comparison of fatality estimates, searcher efficiency, and carcass persistence rates between the cleared plots and road and

pad searches. Additionally, the report will include information on the results from incidental monitoring. Ball Hill will identify recommendations for next steps, and data from these Tier 4a studies will be one component in implementing the adaptive management portion of this BBCS (see Section 4).

5.4 Breeding Bird Survey

At the recommendation of NYSDEC in the *Guidelines for Conducting Bird and Bat Studies at Commercial Wind Energy Projects* (NYSDEC 2016), Ball Hill will conduct breeding bird surveys during the first June after construction is completed. The methodology will be consistent with the transect-style approach conducted for 2016 breeding bird surveys. The results of the post-construction surveys will be compared to the preconstruction surveys to review any evidence of displacement.

5.5 Wildlife Incident Reporting System

In addition to the post-construction fatality monitoring study described above, Ball Hill will implement a general Wildlife Incident Reporting System (WIRS) at the start of operations, and it will remain active for the life of the Project. The purpose of the WIRS will be to standardize the actions taken by site personnel in response to wildlife incidents encountered at the Project and to fulfill the obligations for reporting wildlife incidents.

Any incident (i.e., mortality or injury) involving a federally listed threatened or endangered species, or eagle, will be reported to the USFWS. Ball Hill maintains an ongoing commitment to investigate wildlife incidents involving company facilities and to work cooperatively with federal and state agencies in an effort to prevent and mitigate future wildlife fatalities. It is the responsibility of Ball Hill employees and subcontractors to report all avian incidents to their immediate supervisor.

6 Tier 5 – Research

Tier 5 of the WEG includes "Other Post-construction Studies," which are more research related than the post-construction monitoring guidelines in Tier 4. The WEG indicates that such research studies in Tier 5 will not be necessary for most wind energy projects (USFWS 2012a). No Tier 5 studies are planned at the outset of the Project because no significant adverse impacts are anticipated as a result of Project operation. Research-related studies could later become a part of this BBCS through the adaptive management approach (see Section 4).

7 Implementation of the BBCS

7.1 Document Availability

This BBCS will be maintained by Ball Hill's environmental representative, and a copy of the BBCS will be kept on site throughout operation of the Project.

7.2 Reporting

Ball Hill will prepare an annual report summarizing the results of the monitoring and assessment completed as described in Section 4. Additionally, any incidents involving northern long-eared bat, other ESA-listed species, or eagles will be reported to the USFWS within 24 hours of discovery. Any adaptive management measures implemented will be described in the annual fatality monitoring report.

7.3 Primary Contact

Ball Hill's primary biological/ecological representative is:

Sean Flannery, Ball Hill Wind Energy, LLC
Office phone (612) 455-8449
Cell phone (651) 338-5986
Email Sean.Flannery@res-group.com

8 Quality Assurance and Control

Compliance with this BBCS will be reviewed by Ball Hill annually, and information gathered during the assessment of existing practices will be used to improve the effectiveness of the BBCS. Any noted deficiencies will be addressed with recommendations for specific corrective plans, which will be implemented in a timely manner. Quality assurance and control for the BBCS will be evaluated by assessing the following:

- The effectiveness of avian and bat operational practices;
- The speed and quality of mortality reporting procedures and documentation;
- The speed of response to avian and bat mortalities (e.g., reporting fatalities or making adaptive management responses);
- The quality and accuracy of avian and bat mortality reporting;
- Compliance with company procedures; and
- Public and agency opinions on avian and bat protection procedures.

9 Key Resources

USFWS

Region 5: (includes New York State)
U.S. Fish and Wildlife Service Migratory Bird Permit Office
300 Westgate Center Drive
Hadley, MA 01035
Tel: (413) 253-8200
Email: northeast@fws.gov

New York Field Office
Tim Sullivan
Biologist
3817 Luker Road
Cortland, NY 13045
Tel: (607) 753-9334
Email: Tim_Sullivan@fws.gov

USFWS Office of Law Enforcement

National Headquarters:
Office of Law Enforcement
U. S. Fish and Wildlife Service
4401 North Fairfax Drive
MS-LE-3000
Arlington, Virginia, USA 22203
Tel: (703) 358-1949

Northeast Region (5)
U. S. Fish and Wildlife Service
Office of Law Enforcement
300 Westgate Center Drive
Hadley, MA 01035
Tel: (413) 253-8340

New York State Department of Environmental Conservation

Brianna Denoncour
Avian Ecologist
NYSDEC
Bureau of Habitat
Division of Fish, Wildlife and Marine Resources
625 Broadway, 5th Floor
Albany, NY 12233-4756
Tel: (518) 402-8858
Email: Brianna.Denoncour@dec.ny.gov

Wildlife Rehabilitation Resources

National Wildlife Rehabilitators Association
- http://www.nwrawildlife.org/contact

Wildlife International
- http://wildlife-international.org

The Wildlife Rehabilitation Directory
- http://www.wildlifedepartment.com/lawforms/wildliferehab.pdf

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A Eagle Management Plan

Eagle Management Plan for the Ball Hill Wind Project Chautauqua County, New York

September 2019

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List of Abbreviations and Acronyms

ACP	advanced conservation practices
AGL	above ground level
AMSL	above mean sea level
APP	Avian Protection Plan
Ball Hill	Ball Hill Wind Energy, LLC
BBCS	Bird and Bat Conservation Strategy
BGEPA	Bald and Gold Eagle Protection Act
CFR	Code of Federal Regulations
DDT	dichlorodiphenyltrichloroethane
ECPG	*Eagle Conservation Plan Guidance: Module 1 – Land-based Wind Energy*
DOT	Department of Transportation
EMP	Eagle Management Plan
E & E	Ecology and Environment, Inc.
ECL	Environmental Conservation Law
ECP	Eagle Conservation Plan
EMU	Eagle Management Unit
EO	Executive Order
ESA	Endangered Species Act
HMANA	Hawk Migration Association of North America
km	kilometer
kV	kilovolt
MBTA	Migratory Bird Treaty Act
MW	megawatts
NEPA	National Environmental Policy Act
NYCRR	New York Codes, Rules and Regulations
NYSDEC	New York State Department of Environmental Conservation
O&M	operation and maintenance

List of Abbreviations and Acronyms (cont.)

Project	Ball Hill Wind Project
ROW	right-of-way
RSZ	rotor swept zone
SEQRA	State Environmental Quality Review Act
SWT	Siemens Wind Turbine
USFWS	United States Fish and Wildlife Service
WIMRS	Wildlife Incident Monitoring and Reporting System

1 Stage 1 – Landscape-scale Site Assessment

1.1 Introduction

The purpose of this voluntary, Project-specific Eagle Management Plan (EMP) for the Ball Hill Wind Project (Project) is to document Bald Eagle (*Haliaeetus leucocephalus*) and Golden Eagle (*Aquila chrysaetos*) use of the Project Area, describe efforts made to reduce risk due to Project development, document communications and coordination with the U.S. Fish and Wildlife Service (USFWS) and New York State Department of Environmental Conservation (NYSDEC), and present the proposed post-construction monitoring and adaptive management approach for the Project. The EMP follows the USFWS *Eagle Conservation Plan Guidance Module 1 – Land-based Wind Energy* (ECPG; USFWS 2013), although the Stage 3 collision risk modeling is not included in this EMP since an eagle take permit is not being pursued for the Project at this time. The EMP is part of the Bird and Bat Conservation Strategy (BBCS) for the Project.

1.2 Regulatory Framework

The USFWS is responsible for implementing and enforcing federal wildlife laws, including the Bald and Golden Eagle Protection Act (BGEPA), Migratory Bird Treaty Act, and the Endangered Species Act. NYSDEC is responsible for implementing and enforcing State regulations regarding threatened and endangered species. The BGEPA and New York State regulations are described in more detail below; however, see Section 1.2 of the BBCS for an overview and more details regarding the other regulations.

1.2.1 Bald and Golden Eagle Protection Act (BGEPA)

The BGEPA provides for the protection of the Bald Eagle and the Golden Eagle by prohibiting, except under certain specified conditions, the taking, possession, and commerce of such birds. The BGEPA prohibits anyone, without a permit issued by the Secretary of the Interior, from taking eagles, including their parts, nests, or eggs. The BGEPA defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb." The BGEPA provides civil and criminal penalties for persons who violate the law or regulations.

Under 50 Code of Federal Regulations (CFR) 22.3, disturb is defined as "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause,

based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior." The BGEPA's definition of disturb also addresses effects associated with human-induced alterations at the site of a previously used nest during a time when eagles are not present. Upon an eagle's return, if such alterations agitate or bother an eagle to a degree that interferes with or interrupts normal breeding, feeding, or sheltering habits, and causes injury, death or nest abandonment, then this would constitute disturbance.

In September 2009, the USFWS established rules (50 CFR 22.26 and 22.27) authorizing limited legal take of Bald and Golden Eagles and their nests "when the take is associated with, but not the purpose of, an otherwise lawful activity, and cannot practicably be avoided." Such authorization is provided in the form of a take permit issued by the USFWS, consistent with the regulatory criteria. As part of the 2009 Eagle Permit Rule (USFWS 2009), thresholds of take were established under which a regional population of Bald Eagles, or an Eagle Management Unit (EMU), would maintain stable or increasing eagle populations
In April 2013, the USFWS issued the ECPG. The purpose sections states that the ECPG:

> . . . . . explains the Service's approach to issuing programmatic eagle take permits for wind energy projects under [the authority of the Eagle Permit Rule], and provides guidance to permit applicants (project developers or operators), Service biologists, and biologists with other jurisdictional agencies (state and tribal fish and wildlife agencies, in particular) on the development of *Eagle Conservation Plans* (ECPs) to support permit issuance… The [*ECP Guidance*] is intended to provide interpretive guidance to Service biologists and others in applying the regulatory permit standards as specified in the rule. They do not in-and-of themselves impose additional regulatory or generally-binding requirements. An ECP *per se* is not required, even to obtain a programmatic eagle take permit. As long as the permit application is complete and includes the information necessary to evaluate a permit application under 50 CFR 22.26 or 22.27, the Service will review the application and make a determination if a permit will be issued. However, Service personnel will be trained in the application of the procedures and approaches outlined in the [*ECP Guidance*], and developers who choose to use other approaches should expect the review time on the part of the Service to be longer. The Service recommends that the basic format for the ECP be followed to allow for expeditious consideration of the application materials. (USFWS 2013, 4-5)

To assist wind project proponents in meeting the requirements of 50 CFR 22.26, the ECPG outlines a five-stage approach to developing successful ECPs. These five stages are:

1. Initial landscape-scale site assessment;
2. Site-specific surveys and assessment;
3. Risk Assessment / Fatality prediction;
4. Application of Advanced Conservation Practices (ACPs) that avoid and minimize risk, and application of compensatory mitigation for remaining unavoidable take; and
5. Post-construction monitoring.

The overall goal of this five-stage approach is to use Project-specific information and modeling to develop measures to minimize impacts to eagles. In December 2016, the USFWS revised the regulations for eagle non-purposeful take permits with the intention to add clarity to the regulations, improve implementation, and increase compliance while maintaining strong protection for eagles (Federal Register 2016).

1.2.2 State Laws

In New York State, incidental take permits of endangered and threatened species of fish and wildlife are issued under Article 11-0535, Part 182 of the ECL. If construction or operation of a wind power project results in impacts to state-listed threatened or endangered species or their associated habitat, the project may require an incidental take permit from the (Article 11 permit). The Article 11 permit process requires that measures are implemented to avoid adverse impacts, including avoidance of construction in critical habitat areas, scheduling construction to avoid interruption of breeding, feeding, and migratory activities, and relocation or elimination of specific project components if any of these are determined to result in actual or potential adverse impacts. If, after all reasonable avoidance and minimization measures have been applied, it is determined that the project still may result in a “take” or “taking” of a listed endangered or threatened species, mitigation measures will be required to provide a net conservation benefit to the threatened and endangered species. In New York State, the Bald Eagle is considered threatened and the Golden Eagle is considered endangered.

1.3 Decision Framework

For the landscape-scale site assessment in Stage 1, Ball Hill (as well as previous developers of this site) conducted similar site characterization steps by reviewing public information, consulting with agencies, and conducting field surveys. Updated accounts of this due diligence are presented in the remainder of Section 1 of this EMP, including a review of the life history and local distribution of Bald Eagles, and a review of the Project Area habitat.

Stage 1 of the ECPG is meant to identify an initial risk category, determine whether sites exhibit any obvious substantial risk for eagles, and to help decide whether site-specific surveys are needed to help with the assessment. As site-specific surveys were conducted as part of Stage 2, answers for the Stage 1 questions from the ECPG are included at the end of Section 2.

1.4 Bald Eagle Life History

Bald Eagles are a carnivorous raptor and seek out aquatic habitats for foraging, as their food preference is fish (Buehler 2000). They attempt to take most prey on the wing and will hunt from perches or while soaring over suitable habitat. Although they prefer fish, Bald Eagles are opportunistic feeders and will hunt a variety of aquatic and terrestrial mammals, reptiles, amphibians, crustaceans, and birds. They will also scavenge for carrion; though this behavior is more commonly observed during winter months when other food sources may be limited.

Nesting typically takes place in forested areas relatively close (usually less than 2 kilometers [km]) to suitable foraging opportunities; typically large bodies of water (Buehler 2000). Large nests of sticks and finer materials are typically built in the tops of the largest trees in the area and are re-used for many years. Once paired, male and female Bald Eagles will remain together for life. Females lay a clutch of typically one to three dull, white eggs, which lack distinct markings. Bald Eagles may build one or more alternate nests within their territory and may switch to an alternate nest in successive years, particularly after nesting failure (Buehler 2000). In New York, pair bonding activity occurs in the fall, with courtship behavior and nest construction occurring anytime between October and early December. The female lays eggs from mid-February through late March, and young hatch from late March through early May. Young fledge from the nest in mid to late summer at about 12 weeks and become independent in 17 to 20 weeks. According to the *National Bald Eagle Management Guidelines* (USFWS 2007), the chronology of typical reproductive activities of Bald Eagles in the northern United States, including New York State, is as follows:

- Nest building (December through February);
- Egg laying/incubation (February through April);
- Hatching/rearing young (March through June); and
- Fledging young (June through August).

These are the time periods during which Bald Eagles are sensitive to anthropogenic disturbance, with nest building considered to be when eagles are most sensitive. After fledging, juvenile Bald Eagles usually roam up to 0.25 miles (0.4 km) from their respective nest location and are still dependent upon adults to feed them for approximately six weeks (USFWS 2007).

Bald Eagles typically winter in the lower 48 United States and along coastal portions of Canada and Alaska (Buehler 2000). In winter, Bald Eagles are typically found near aquatic areas with some open water for foraging. In the eastern United

States, they winter along major river systems and near lakes and/or reservoirs. Ideal winter habitat generally includes an abundance of food, presence of roost sites, which provide protection from inclement weather, and absence of human disturbance. They will tolerate some human activity in areas of high prey availability, such as below hydroelectric facilities along rivers (Buehler 2000). Bald Eagles may concentrate in large numbers (several hundred to over 1,000) at ideal wintering sites. They require perching habitat associated with their winter foraging areas, which generally consists of tall trees less than 164 feet (50 meters) from the foraging area. Additionally, in winter, Bald Eagles will roost communally. Winter roosts typically contain large trees that are open and accessible, and are generally associated with aquatic foraging areas, but may be located farther from water than nests. They are also generally located away from houses and roads (Buehler 2000).

1.5 Historical Data on Bald Eagle Populations

Bald Eagle populations in New York State have been in recovery since the mid-1900s, when the use of pesticides (primarily dichlorodiphenyltrichloroethane [DDT]), caused reproductive impairment and direct mortality to eagles via bio-accumulation in fish populations, which made up the majority of the Bald Eagles' diet. The continued use of pesticides and loss of habitat due to human development had led to a virtual extirpation of Bald Eagles in New York State. In 1972, DDT was banned and in 1976 a NYSDEC project to re-introduce Bald Eagles began. In 1989, the New York State Bald Eagle Restoration Project came to an end, as the project had reached its goal of establishing 10 breeding pairs within the state. The Bald Eagle was down-listed by NYSDEC from endangered to threatened in 1999.

Since that time, Bald Eagle populations have been experiencing a statewide increase from near extirpation in 1970 (one nesting pair in New York State) to 254 nesting pairs in 2014 (Nye 2010, NYSDEC 2016). The population has reportedly reached more than 300 breeding pairs and over 500 nesting territories in 2019. Although the original NYSDEC plan was to delist the Bald Eagle once the number of breeding pairs reached 40, and a current conservation objective is to maintain a population of at least 200 breeding pairs, the State still lists the species as Threatened (NYSDEC 2016).

1.6 Current Distribution

The population of Bald Eagles in New York State has been steadily increasing over the past 30 years and has more than quadrupled in the last decade. Bald Eagle numbers have increased from the brink of extirpation in the state to healthy, sustainable population levels, which are continuing to experience nesting success and population growth. The NYSDEC Conservation Plan for Bald Eagles in New York State (NYSDEC 2016) is consistent with population growth, as record numbers of eagles and nesting pairs are identified in the state with nearly every passing year. Bald Eagle populations have been experiencing a statewide increase from near extirpation in 1970 (one nesting pair in New York State) to 254 nesting

pairs in 2014 (NYSDEC 2016). The population has reportedly reached more than 300 breeding pairs and over 500 nesting territories in 2019.

Annual wintering surveys conducted throughout New York State continue to yield increasing counts of Bald Eagles. While it is unknown how many of these eagles are actually residents of the state, it is assumed that residents make up an increasing percentage of the "wintering" population each year (Nye 2010).

NYSDEC also tracks Bald Eagle productivity with the number of pairs producing fledglings and how many young are reared. Overall Bald Eagle productivity continues to be strong in New York, where 72% of all breeding pairs successfully fledge young, with an average of 1.3 successful fledged young per pair (Nye 2010).

Chautauqua County borders the southern shores of Lake Erie and Cattaraugus Creek. As recently as 2000, no known Bald Eagle nests were identified within the county (Nye 2010); however, at least seven nests had been identified by 2010 and the numbers continue to increase. Many of the Chautauqua County nests are along the tributaries of Lake Erie and other nearby water bodies. While nesting only occurs during a certain time of year, foraging activities occur year-round, especially along the Lake Erie shore. The Lake Erie shoreline also attracts non-breeding Bald Eagles for foraging opportunities, especially in late summer and winter. Dunkirk Harbor attracts Bald Eagles due to warm water discharge from a nearby power plant (when active), which generally keeps the harbor ice free. This ice-free area becomes a concentration area for fish and waterfowl thus attracting Bald Eagles.

An influx in Bald Eagle activity occurs throughout upstate New York during periods of regular migration. In western New York, this increase occurs during spring migration, when raptors move northward until reaching the Great Lakes. To avoid flying over the cold lake waters, migrating raptors follow the southern shorelines and take advantage of beneficial updrafts where possible. Raptor migration areas in New York State are well documented and locations where large numbers of migrating raptors occur are already known. Currently, 36 sites in New York State have reported results to the Hawk Migration Association of North America (HMANA) database (HMANA 2019). Many of these prime raptor migration locations are along the Great Lakes (in spring) and in the lower Hudson Valley (in fall). In spring, raptor migration is concentrated along the southern shores of the Great Lakes, as raptors avoid crossing large bodies of water. Migratory raptors are also found in concentrated numbers along prominent ridgelines. There is one raptor monitoring location (i.e., "hawk watch") in Chautauqua County in the town of Ripley, approximately 24 miles (39 km) southwest of the Project Area, and there is one located near the Lake Erie shoreline in the town of Hamburg, approximately 23 miles (37 km) northwest of the Project Area, where thousands of raptors are tallied each spring. The Ripley Hawk Watch identified an average of 211 Bald Eagles and 1.4 Golden Eagles per year over the last

eight years (2012 through 2019), and the Hamburg Hawk Watch identified an average of 80 Bald Eagles and 1.9 Golden Eagles per year over the last eight years (HMANA 2019). There is much less raptor migration in the fall season as southward bound raptors follow the northern shorelines of the Great Lakes and largely bypass western New York.

As the Project Area is not immediately proximate to the shorelines of the Great Lakes, large bodies of water, or lengthy ridgelines, raptor migration in the Project Area is diffuse and without regularly occurring concentration points. There are no geographical or topographical features within the Project Area that attract or concentrate large numbers of migrating raptors. The closest is the Portage Escarpment which is located adjacent to the northwest portion of the Project Area. Raptors concentrate along the lake side of this escarpment as they migrate to their northern breeding areas. The concentration of raptors along the Portage Escarpment is greatest where the escarpment is closer to Lake Erie, such as near the Ripley Hawk Watch (approximately 2.5 miles (4 km) from the shore). The Portage Escarpment is located approximately 7 miles (11 km) from the shore in the vicinity of the Project Area.

Some eagles will migrate over the Project Area, especially during spring migration; however, it would not be expected that the migrant eagles would remain in the Project Area for long periods of time. Local eagles have been documented in the area periodically throughout the year and likely utilize local forested areas for perching, roosting, and nesting.

1.7 Habitat Review

The Project Area is located in Chautauqua County within an area of 9,715 acres in the towns of Villenova and Hanover, New York. Land uses within the Project Area are predominantly a mixture of forested (5,211 acres) and agricultural (4,216 acres) land. Additional acreage within the Project Area consists of wetlands, roads and other paved surfaces, scattered residences, buildings, and open water features, such as farm ponds. In this area, the principal agricultural enterprise is dairy farming. Corn and hay are the main crops, but some small grain crops are grown as well. The northern portion of the Project Area, in the town of Hanover includes vineyards and orchards. Most of the natural stands of forest within the Project Area are represented by mixed hardwoods dominated by sugar maple (*Acer saccharum*), red oak (*Quercus rubra*), black cherry (*Prunus serotina*), white ash (*Fraxinus Americana*), and American beech (*Fagus grandifolia*).

The more mature stands of beech maple mesic and hemlock – northern hardwoods are present primarily in the southern portion of the Project Area, while the northern portion of the Project Area is dominated primarily by agriculture, successional northern hardwoods, and vineyards, which offer fewer opportunities for nesting Bald Eagles, but are in proximity to Lake Erie and Cattaraugus Creek. Of the community types present within the Project Area, Bald Eagles would be most apt to utilize the beech maple mesic and hemlock – northern hardwood habitats, especially those in proximity to open water sources where fish are prevalent. While few open-water sources exist within the Project Area, a number of lakes, ponds, and reservoirs exist outside of the Project Area, which may potentially be utilized by eagles for foraging opportunities. Furthermore, stands of large hardwoods and pines within the Project Area could potentially offer nesting areas for Bald Eagles in addition to protected perching areas. Additionally, the opportunity for carrion exists throughout the Project Area, especially in fields and along roadways; however, many of these areas experience regular anthropogenic disturbance, which may deter any Bald Eagle activity. Likewise, open water sources are located in the vicinity of the Project Area, which offer preferred food sources (i.e., fish); foraging of carrion is unlikely during times of the year when lakes and other water features are open (not frozen). The following are open water sources that have been identified in the vicinity of the Project Area that could provide foraging opportunities due to their habitat and proximity to the Project Area. Known nest locations are described later in Section 2.3.3.

East Mud Lake

East Mud Lake lies approximately 0.25 miles (0.4 km) east of the Project Area and is approximately 38.4 acres in size. The west side of the lake is forested with hemlock – northern hardwoods, which continue into the eastern portion of the Project Area. No publicly available data elucidates the fish community at East Mud Lake; however, the presence of large hardwood trees, which presumably offer perching opportunities in the immediate vicinity of the lake, suggests that Bald Eagles may forage at this lake.

West Mud Lake

West Mud Lake lies partially within the Project Area along the southwestern edge near Zahm Road and is approximately 38 acres in size. The lake is primarily surrounded by successional northern hardwoods and agricultural land, which would not offer ideal nesting and/or perching opportunities for Bald Eagles; however, the very northern portion of the lake is adjacent to hemlock – northern hardwoods, which offer perching opportunities depending on the size of the trees.

Silver Creek Reservoir

The Silver Creek Reservoir lies approximately 0.7 miles (1.1 km) east of the Project Area boundary and is approximately 44.8 acres in size. The reservoir is surrounded by mixed forest and scrub-shrub habitat on all sides and is adjacent to a private residence. The purpose of the reservoir is to provide drinking water for Silver Creek.

Fredonia Reservoir

The Fredonia Reservoir lies approximately 6.8 miles (11 km) west of the Project Area boundary and is approximately 51.2 acres in size. The reservoir is surrounded primarily by deciduous forest and contains a small forested island, which could serve as perching habitat for Bald Eagles. No publicly available resources offer information regarding the fish community at this reservoir; however, fishermen have been observed utilizing it for recreational purposes.

Lake Erie

Lake Erie is approximately 2.7 miles (4.3 km) north at the closest point to the Project Area boundary, and nearest proposed turbine location is more than 7 miles (11 km) from the closest point of the Lake Erie shoreline. The lake offers a multitude of foraging opportunities (fish and ducks) for Bald Eagles and is a world-class fishery. Eagles will utilize the shoreline habitat to search for prey while taking advantage of the updrafts created from the winds striking the steep banks of Lake Erie.

Cattaraugus Creek

At its closest point, the Cattaraugus Creek is approximately 4.25 miles (6.8 km) northeast of the Project Area. The creek empties into Lake Erie north of Silver Creek and west of Irving, New York. The creek generally runs in an east to west direction and has a complex structure (many curves). Furthermore, the creek provides important stream corridor habitat and is well vegetated along its banks with trees, which provide potential perching and roosting opportunities for eagles. The Cattaraugus Creek is home to a broad array of fish species, which serve as prey to eagles.

Dayton Gravel Ponds

The Dayton gravel ponds are approximately 5.3 miles (8.5 km) to the southeast of the Project Area and are near Conewango Creek. The Dayton gravel ponds site is an active quarry that specializes in mining non-metallic materials. This area is made up of several ponds that are separated by gravel roads. Recreational fishing occurs at the ponds and presumably there is prey for Bald Eagles. There are forested areas in the vicinity of the ponds which provide perching and roosting habitat for eagles.

Summary of Foraging Areas

There is a relatively low occurrence of quality Bald Eagle foraging habitat in the actual Project Area as it is comprised primarily of successional habitat in addition to agricultural land and vineyards. While this land likely provides suitable habitat for smaller mammals that eagles may prey upon, foraging is less likely to occur in the Project Area because nearby waterbodies provide better foraging opportunities.

1.8 Consultation History

Consultation with NYSDEC and USFWS has taken place since the initial development of this Project in 2006. Each developer has met with the agencies to discuss site characterization for wildlife, survey protocols, and results. All wildlife survey reports were included in the environmental impact statement process. The most recent meeting with the USFWS Regional Eagle Coordinator to discuss eagle survey results was in Hadley, Massachusetts, in January 2017, while the most recent update by email with USFWS staff was in October 2018.

2 Stage 2 – Site-specific Surveys and Assessment

2.1 Introduction

Site-specific surveys were conducted in 2006, 2007, 2008, 2012, 2013, 2016, and 2017 to ascertain the degree to which the Project Area is utilized by migratory raptors (2006, 2007, and 2008) and eagles (2012-2013 and 2016-2017). Survey protocols and results were shared with NYSDEC and the USFWS.

2.2 Methodology

2.2.1 Migratory Raptor Surveys

Migratory raptor surveys were conducted by E & E in the Project Area for three days during the fall 2006 migratory season and three days during the spring 2007 raptor migratory season as per a work plan submitted to NYSDEC (E & E 2006). Six additional surveys were conducted during the spring 2008 season.

The protocol included collecting field data on migrating raptors, such as species identification, number of individuals, flight direction, and estimated flight altitude (above or below 400 feet (122 meters) above ground level [AGL]). Birds that were observed flying in a non-northerly direction during the fall migration (or flying in a non-southerly direction during spring migration) were assumed to be migrating; whereas, birds observed flying north in fall (or south in spring) or hunting near the ground, were considered to be local birds. The surveys were conducted between 9:00 a.m. and 4:00 p.m. on days of preferable raptor migration weather to the extent possible. Scheduling of surveys in the fall was attempted for days following the passage of cold fronts and/or the presence of light or northerly winds, with little or no precipitation. Favorable weather conditions in spring include little or no precipitation, warmer than average temperatures, and light or southerly winds.

The same protocol was used for both the spring and fall surveys; however, the raptor sampling location was changed after the fall 2006 surveys because of property access issues. The sampling locations were selected during a field visit. With an agreeable landowner, a good view of the surrounding area, and proximity to the assumed turbine locations, the meteorological (met) tower site was selected as the sampling location in the fall 2006. Another field was selected in the spring of 2007 that also had an agreeable landowner, a good view of the surrounding area, and proximity to the assumed turbine locations. Spring 2008 surveys were

conducted at the same locations as the spring 2007 surveys. The spring survey location was located less than 1 mile (1.6 km) south of the fall sampling location. The fall raptor survey location was 1,657 feet (505 meters) above mean sea level (AMSL), and the spring raptor survey location was 1,654 feet (504 meters) AMSL.

2.2.2 Eagle Point-Count Surveys (2012-2013)

Thirteen eagle point-count survey locations were established within the Project Area (see Figure 2-1). Survey points included a 2,625-foot (800-meter) radius and were selected to avoid any overlapping survey areas as per the ECPG. Point locations were concentrated in the areas of proposed turbines (points 1 through 10), and three points were surveyed along the previously proposed transmission line, which has been replaced with underground collection lines (points 11 through 13).

Surveys began and ended at various times during the day, with emphasis placed on the midday period, per the ECPG, as eagles are most active during this time. Surveys were conducted in all weather conditions, with the exception of those that limit visibility to below 656 feet (200 meters) vertically and 2,625 feet (800 meters) horizontally. Surveys were conducted with alternating start and end times to limit temporal bias.

Each point-count survey spanned a period of one hour. To provide an efficient and standardized account of eagle exposure rates, eagles observed in flight were documented within 1-minute intervals. One exposure minute was recorded for any eagles observed perching throughout the hour-long survey windows. An E & E observer documented the times, directions, behavior, age, number of individuals, and approximate flight height for eagle flights during the point-count period. Because two different turbine heights would be used in the towns of Villenova and Hanover, the estimated rotor swept zone (RSZ) was conservatively combined to include the total RSZ between the two towns ranging from 89 to 495 feet (27 to 151 meters) AGL. Estimated flight height was described as being within the RSZ (89 to 495 feet (27 to 151 meters) AGL), above the RSZ (greater than 495 feet [151 meters] AGL), or below the RSZ (0 to 89 feet [0 to 27 meters] AGL). Following the USFWS issuance of revised, draft technical appendices of the ECPG in August 2012, E & E also began noting eagle flights as above or below 656 feet (200 meters) to be consistent with the revised protocol. E & E also reviewed field notes from the earlier surveys to assign eagle minutes as above or below 656 feet (200 meters), which has become more relevant with the proposal for taller turbines at 23 locations up to 599 feet (183 meters) AGL. Weather data such as wind direction and speed, temperature, precipitation, and cloud cover were also recorded (USFWS 2012).

Each survey of the 13 locations was split into two survey days; generally, six point-count surveys were conducted one day and seven were conducted on the other day. Two rounds of surveys per month were conducted between March 2012 and February 2013.

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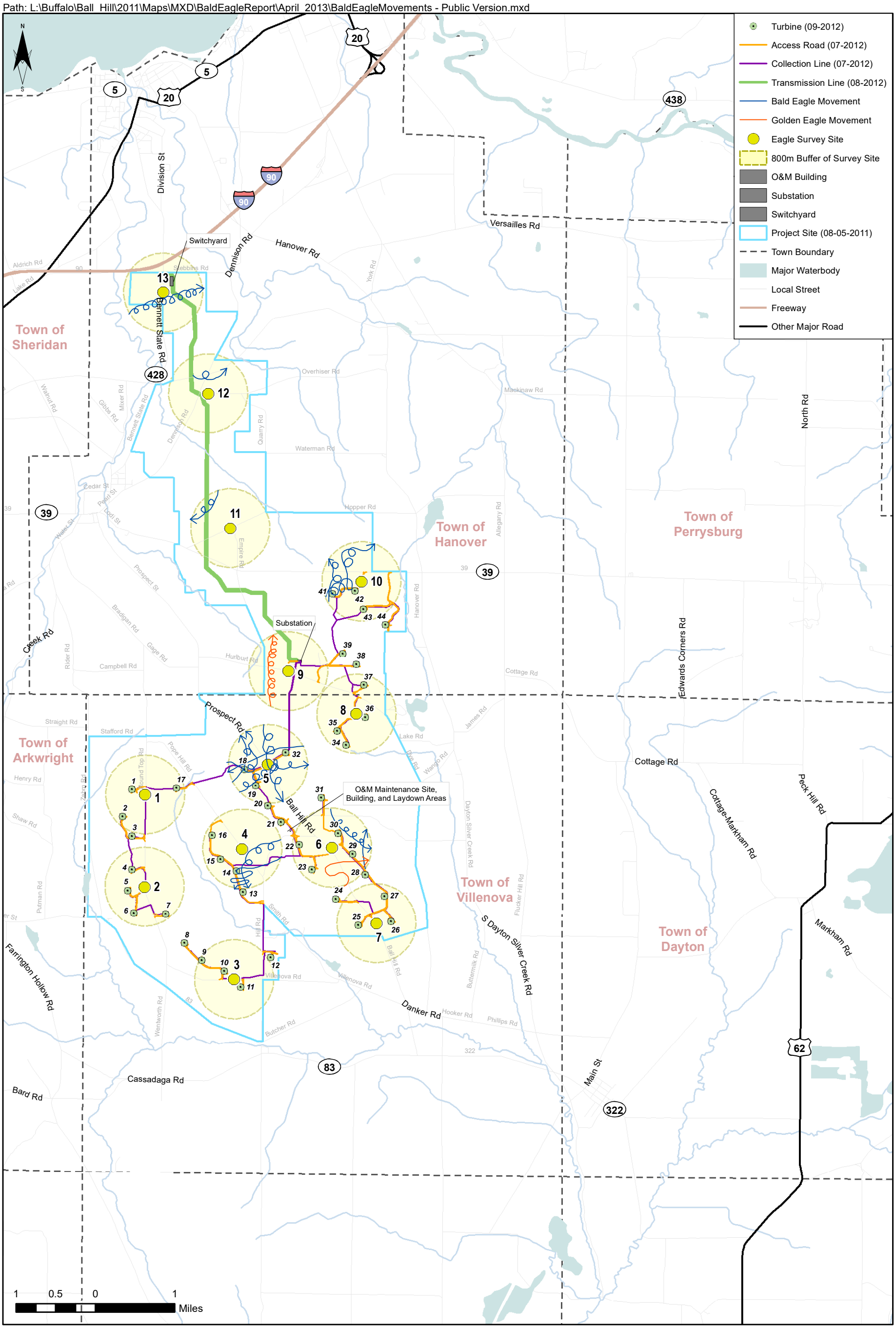

Last Updated: 4/9/2013

Figure 2-1
Eagle Movement
Ball Hill Wind Energy Project
Ball Hill Windpark, LLC

2.2.3 Eagle Point-Count Surveys (2016-2017)

E & E conducted a second year of eagle use point-count surveys over a 12-month period from March 2016 through February 2017. During each round of surveys, 13 points were visited for 1 hour once per month, requiring a total of two field days per month (see Figure 2-2). Point locations were concentrated in the areas of proposed turbines (points 1 through 10), and three points were surveyed along the previously proposed transmission line (points 11 through 13). The completed survey effort included 156 total survey hours and supplements the 312 survey hours previously completed at the site in 2012 and 2013, for a total of 468 standardized survey hours from the Project site.

Surveys generally began at 8:00 a.m. and ended at approximately 5:00 p.m., with alternating start and end points. Surveys were conducted during all weather conditions, with the exception of conditions that limit visibility to below 656 feet (200 meters) vertically and 2,625 feet (800 meters) horizontally. In order to provide an efficient and standardized account of eagle exposure, eagles were recorded in flight within 1-minute intervals. One exposure minute was recorded for any eagle observed perching throughout the survey window. The time, direction, behavior, age, number of individuals, and approximate flight height for eagle flights were documented on field survey forms, as recommended in the ECPG. The observer also recorded weather data, including wind direction and speed, temperature, precipitation, and cloud cover.

2.2.4 Bald Eagle Nest Monitoring

E & E obtained status information from NYSDEC from their monitoring of the local Bald Eagle nests in 2012, 2015, and 2016. E & E provided information to NYSDEC regarding eagle activity during the nesting season for the purpose of furthering knowledge of Bald Eagle activity and nesting within the area.

Two known locations of Bald Eagle nests in the vicinity of the Project Area were monitored briefly during field visits to the Project Area for both years of eagle point-count surveys. All observations were made from roadsides; any Bald Eagle activity observed at the nests was documented. When no activity was detected at the nests, monitoring efforts generally lasted less than 15 minutes.

2.3 Results

2.3.1 Migratory Raptor Surveys

2.3.1.1 Fall Raptor Surveys

Fall migratory raptor surveys were conducted by E & E on September 15, October 5, and November 1, 2006, for a total of 21 survey hours. No eagles (Bald Eagles or Golden Eagles) were detected.

2.3.1.2 Spring Raptor Surveys

Spring migratory raptor surveys were conducted on April 22, 23, and 30, 2007, for a total of 21 survey hours in 2007; and March 30, April 7, 15, and 24, and May 6 and 13, 2008, for a total of 42 survey hours in 2008. In 2007 a total of two Bald Eagles were observed (one local and one migrant); and in 2008 a total of two

Bald Eagles (one local and one migrant) and two Golden Eagles (both migrant) were observed.

2.3.2 Point Count Surveys (2012-2013)

Seventeen Bald Eagle sightings and two Golden Eagle sightings were made during the point count surveys (see Figure 2-1). The greatest number of eagle observations were made at point 5 (six observations), followed by points 6 and 12 (three observations each), point 12 (three observations), point 10 (two observations), point 4 (two observations), and points 9, 11, and 13 (one observation each) (see Figure 2-1). Two incidental Bald Eagle sightings were made inside the Project Area but outside of survey point radii. One incidental Bald Eagle was observed to the east, outside of the survey radius of point 10, on May 25, 2012. Another incidental Bald Eagle was observed to the south, outside of the survey radius of point 13, on August 8, 2012.

Sightings within the Project Area ranged from 0 to 11 sightings per survey round. The greatest number of sightings occurred during the March 13 and 14, 2012, survey round, with a total of 10 Bald Eagle sightings and one Golden Eagle sighting. Bald Eagles were identified in the Project Area during six of the 24 survey rounds, including both March rounds, the late April round, the early August round, and the early September and October rounds. Golden Eagles were identified during two of the 24 survey rounds, with both observations occurring during the March migration period. The sighting rates in the Project Area (not including incidental sightings) are 0.05 Bald Eagles per hour and 0.01 Golden Eagles per hour.

Table 2-1 Eagles Sighted within the RSZ[1] during the 2012-2013 Surveys

Species	No. of Eagle Sightings	No. Observed Flying in RSZ	Percentage	Total Minutes below 656 Feet (200 Meters) AGL
Bald Eagle	17	7	41%	19
Golden Eagle	2	1	50%	3

Note:
[1] At the time of the surveys, the RSZ was proposed at 89 to 495 feet (27 to 151 meters) AGL.

Key:
AGL = above ground level.
RSZ = rotor swept zone.

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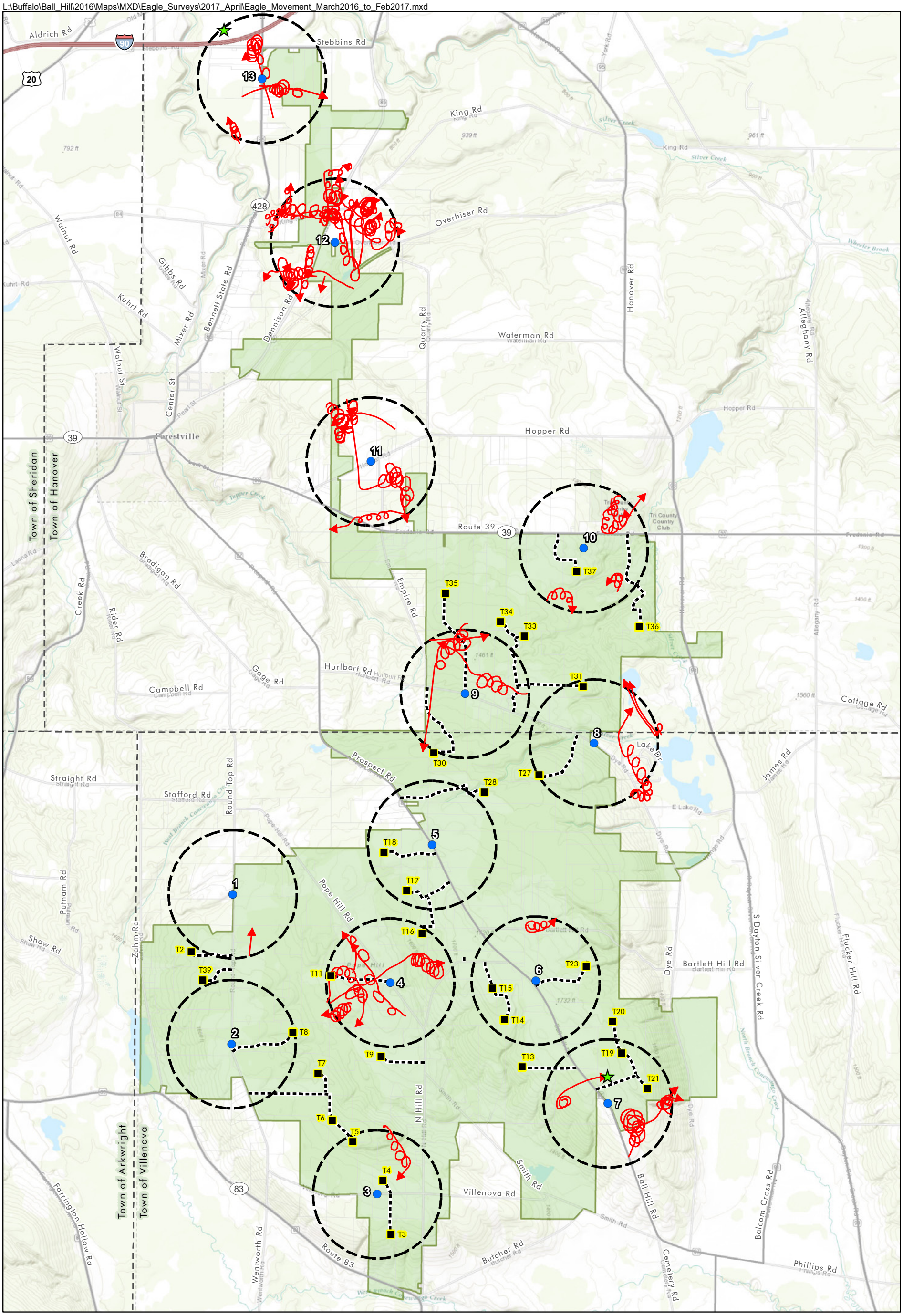

Turbine
Access Road
Interstate
Major Road
Local Street
Town Boundary
Parcel Boundary

Eagle Survey Point
Perch Location
Bald Eagle Flight Path
Survey Site 800m Buffer
Project Area

Figure 2-2
Eagle Movements, March 2016 – February 2017
Ball Hill Wind Project
Chautauqua County, New York
Ball Hill Wind Energy, LLC

0 0.25 0.5 1 Miles

Of the 19 eagles observed during the point-count surveys, eight were observed flying in the RSZ (89 to 495 feet [27 to 151 meters] AGL) for at least a portion of the viewing time. The remaining 11 sightings were estimated to be flying either above or below the RSZ. At the time of the surveys, the RSZ was proposed to be between 89 to 495 feet (27 to 151 meters) AGL, but the data were tabulated to include all eagles that were sighted below 656 feet (200 meters) AGL. The total survey effort amounted to a total of 312 hours of survey time, or 18,720 minutes. The amount of time that Bald Eagles were observed below 656 feet (200 meters) AGL amounted to 19 minutes (0.10% of the total survey time inside the Project Area), and the amount of time that Golden Eagles were observed below 656 feet (200 meters) AGL amounted to 3 minutes (0.02% of the total survey time inside the Project Area).

Of the 17 Bald Eagles observed during the surveys, four were adults and 13 were immature. One of the Golden Eagles observed during the surveys was an adult and the other was an immature eagle.

A majority of Bald Eagle sightings occurred during the March 13 and 14 survey. Wind direction during this period was from the southwest, which may have facilitated the movement of eagles migrating to the north; however, the majority of Bald Eagle sightings on these days were determined to be local based on their behavior and flight direction. Of all the eagles observed; only two were determined to be migratory. Otherwise, no apparent trends were detected correlating weather conditions and eagle sightings.

More details on the results are included in the report on the 2012-2013 surveys (E & E 2013).

2.3.3 Point Count Surveys (2016-2017)

Fifty Bald Eagle sightings and no Golden Eagle sightings were recorded within the 2,625-foot (800-meter) -radius survey plots during the point-count surveys conducted from March 2016 through February 2017. The eagle survey effort in 2016 and 2017 amounted to a total of 156 hours (9,360 minutes) of survey time. Bald Eagles were identified in the Project area during 11 of the 12 monthly survey rounds conducted. No eagles were detected during December 2016 surveys, although there was one incidental Bald Eagle sighting outside the plot radius during that month. No Golden Eagles were identified during the 12 survey rounds. Figure 2-2 depicts the eagle flight paths within each survey point. The mean sighting rates in the Project area (not including incidental sightings) were 0.32 Bald Eagles per hour and 0.00 Golden Eagles per hour.

The greatest number of eagle observations (18) were made at point 12, followed by point 11 (six observations), points 4 and 13 (five observations each), point 10 (four observations), points 7, 8, and 9 (three observations each), and points 1, 3, and 6 (one observation each). Sighting rates by point ranged from 0.00 to 1.50 eagles per hour. Eight incidental Bald Eagle sightings were made. Five incidental Bald Eagles and one unidentified eagle were observed outside of the 2,625-

foot (800-meter) survey radius of point 13 on September 1, 2016, point 10 on December 5, 2016, point 11 on January 9, 2017, and points 8 and 11 on February 14, 2017. Two Bald Eagles were incidentally observed within the survey radius, following the completion of surveys at point 2 on April 25, 2016, and at point 8 on October 7, 2016.

Bald Eagle sightings within the Project area ranged from zero to 18 sightings per survey round. Detection rates of Bald Eagles were highest during September, with 1.38 eagles per survey hour. February had the next highest detection rate, with 0.77 eagle/hour; followed by April and May with detection rates ranging from 0.38 to 0.46 eagles/hour during this period. Lower Bald Eagle detection rates were documented in the other months (0.00 to 0.23 eagles/hour). Golden Eagles were not recorded during the survey period (0.00 eagles/hour).

Of the 50 eagle sightings observed during the point-count surveys to date, 70% (35 sightings) were observed flying below 656 feet (200 meters) above ground level (AGL) for at least a portion of the viewing time.

Of the 50 Bald Eagle sightings recorded during the surveys, 25 were adult eagles and 25 were immature. In general, adult Bald Eagles were observed throughout the survey period except for August and December. Immature Bald Eagles were observed during the April, May, August, September, November, and February surveys. Most of the sightings of immature Bald Eagles were likely transient eagles.

More details on the results are included in the report on the 2016-2017 surveys (E & E 2017).

2.3.4 Bald Eagle Nest Monitoring

In 2011, there were two known Bald Eagle nests plus an unspecified number of Bald Eagle nests along Cattaraugus Creek within 10 miles (16 km) of the Project Area (Pietrusiak 2012). Evidence of nesting was discovered in 2012 at two additional locations within 10 miles (16 km) of the Project Area.

In 2016, there were two known Bald Eagle nests in the close vicinity of the Project area, plus several other Bald Eagle nests within 10 miles (16 km) of the Project area. Bald Eagle nest locations are considered sensitive information; therefore, no figures are included in this document to identify these nest locations. The descriptions below of nests in the vicinity (i.e., within approximately 10 miles [16 km]) of the Project area include the "Thruway nest" and the "Hanover nest," which were monitored during the March 2016 to February 2017 field season.

- The "Thruway nest," located in the vicinity of the New York State Thruway, is approximately 5 miles (8 km) north of the nearest proposed turbine. This nest site has been active for several years, and E & E confirmed it was active again in 2016 and suspected it was active in 2017 based on Bald Eagle behavior. E & E observed this nest from a distance for a total of 207 minutes during

21 visits between March 2016 and February 2017. An incubating adult Bald Eagle was observed on March 14, 2016, and adults were observed incubating or in the vicinity of the nest in March, April, and May. By late May leaves had obscured the nest from view. This nest probably fledged two young, as two juvenile Bald Eagles were seen in the vicinity of the nest tree on July 15, 2016. There was no eagle activity observed near the nest from August 2016 through January 2017. However, on both visits in February 2017 two adult Bald Eagles were observed perched on the nest edge, inside the nest, and in the vicinity of the nest.

- The "Hanover nest" was discovered by E & E in early April 2012. The nest is in the vicinity of the Silver Creek Reservoir, approximately 0.7 miles (1.1 km) northeast of the nearest Project component (an access road). The closest turbine is located 6,000 feet (1,829 meters) to the southwest of the nest. E & E confirmed the nest was active in 2016 and 2017. E & E observed this nest from three varying distances for a total of 544 minutes during 24 visits between March 2016 and February 2017. An incubating adult Bald Eagle was observed on March 14, 2016, and adults were observed perched on or near the nest in subsequent visits in March, April, and May. The nest apparently failed by May 25, 2016, as indicated by a flycatcher perched on the nest edge. No Bald Eagle activity was recorded at or near the nest during observations between June 2016 and January 2017. However, on February 14 and 27, 2017, an incubating adult Bald Eagle was observed on the nest with a second adult Bald Eagle perched nearby.
- There are an unspecified number of active nests along Cattaraugus Creek in the vicinity of the Cattaraugus Indian Reservation. The distance from the closest turbine to the area with nests along Cattaraugus Creek is approximately 6.3 miles (10 km).
- The "Dayton nest" is located approximately 5.5 miles (8.9 km) southeast of the Project area and has been active in recent years according to NYSDEC.
- The "Pomfret nest" is located approximately 7.0 miles (11 km) west of the Project area, in the vicinity of the Fredonia reservoir. NYSDEC discovered nesting activity in this location in 2012 and it has been active since that time.
- The "Dunkirk nest" is located approximately 9.5 miles (15 km) west of the Project area. This is a more recent nest location according to NYSDEC.
- The "Sheridan nest" is located approximately 3.0 miles (4.8 km) northwest of the Project area. This is a more recent nest location according to NYSDEC.

2.4 Review of the ECPG Site Assessment Questions

The five questions included in the Stage 1 assessment from the ECPG revised technical appendices (USFWS 2012) are reviewed in this section following the availability of site-specific data. The answers to these questions have also been discussed in previous sections.

1. *Does existing or historical information indicate that eagles or eagle habitat (including breeding, migration, dispersal, and wintering habitats) may be present within the geographic region under development consideration?*

   Yes. While there are no known nests within the Project Area, there are several nests within 10 miles (16 km) of the boundary, with the closest being discovered in 2012. Likewise, there is not prime Bald Eagle foraging habitat within the Project Area but there are several water bodies in vicinity of the Project Area that likely serve as foraging areas, and eagles could fly through the Project Area en route to foraging areas. It is possible that Bald Eagles could nest in the future at these water bodies if the regional population continues to expand. Migration through the Project Area is more likely in the spring season; however, the Project Area is not considered to be in a pathway of increased raptor migration. There is no evidence of wintering habitat within the Project Area; however, it is possible that Bald Eagles could still forage, fly, or roost within the Project Area during the winter season.

2. *Within a prospective project site, are there areas of habitat known to be or potentially valuable to eagles that would be destroyed or degraded due to the Project?*

   No. Point-count surveys in the Project Area did not identify any areas of frequent Bald Eagle occurrence. There is minimal impact to wetlands from the Project design. The proposed turbine locations are away from riparian areas and water bodies.

3. *Are there important eagle use areas or migration concentration sites documented or thought to occur in the Project Area?*

   No. Point-count surveys in the Project Area did not identify any areas of frequent Bald Eagle occurrence. Migration through the Project Area is more likely in the spring season; however, the Project Area is not considered to be in a pathway of increased raptor migration.

4. *Does existing or historical information indicate that habitat supporting abundant prey for eagles may be present within the geographic region under development consideration?*

   No. There is not prime Bald Eagle foraging habitat within the Project Area but there are several water bodies in vicinity of the Project Area that likely serve as foraging areas, and eagles could fly through the Project Area en route to foraging areas.

5. *For a given prospective site, is there potential for significant adverse impacts to eagles based on answers to above questions and considering the design of the proposed project?*

   No significant adverse impacts to eagles are anticipated from construction or operation of this Project; however, Bald Eagles may occur in the Project Area throughout the year. As such, there is some potential risk to Bald Eagles from the Project.

While the potential for unavoidable Bald Eagle-related impacts exists, it is anticipated that the Project would not significantly impact local or migrating Bald Eagles. Later sections of the EMP, as part of the Project BBCS, include measures to avoid and minimize potential impacts to the maximum extent practicable.

3 Stage 3 – Risk Assessment

3.1 Bald Eagle

The Project Area is situated east and south of the Portage Escarpment and Lake Erie plain, where Bald Eagles and other raptor migrants are concentrated during spring migration. It is likely that some of the eagles observed March through May within the Project Area were migrants. The local flights in the Project Area may have been between possible foraging areas (i.e., East Mud Lake, West Mud Lake, Lake Erie, Silver Creek Reservoir, Fredonia Reservoir, Dayton gravel ponds). Bald Eagle sightings made at survey points closest to the known nest locations were lower than many other survey points.

The potential risk of adverse effects to Bald Eagles exists within the Project Area, as they could occur either within or in the vicinity of the Project Area throughout the year and there are several nests nearby. Survey results suggest that movement within the Project Area is greatest during the spring migratory season, when local eagle numbers may be supplemented with migrants heading north. Survey results also revealed little use of the Project Area from the nearby breeding pairs.

Based on suitable foraging habitat and relative proximity to the nearest nesting locations, Bald Eagles may enter the Project Area en route to visit East Mud Lake, West Mud Lake, Lake Erie, Silver Creek Reservoir, Fredonia Reservoir, and the Dayton gravel ponds. Coming from the nearest nesting locations, Bald Eagles could reach these small lakes without crossing the Project Area; however, as has been documented during the eagle point count surveys, some flights within the Project Area are expected. Eagle populations in western New York and especially Chautauqua County are rapidly expanding; as populations continue to increase, greater nest densities may occur in preferable habitats, and eagles may also begin to nest in less ideal habitats further from foraging areas.

3.2 Golden Eagle

Golden Eagles are uncommon migrants over western New York. A total of four Golden Eagles were observed during the various surveys and were generally flying north within the known migration period for this species in New York State. In general, strong winds from the south are conducive to large migratory raptor movements during peak migratory periods of the year. Due to their known status in New York State and their brief appearance during surveys, it is assumed that all of these Golden Eagle sightings were of migrants passing through the Project

Area and not wintering birds, which would be expected during periods of migratory movement. Transient Golden Eagles would be expected to fly over the Project Area during usual periods of migration, specifically spring migration. Due to the brief period when Golden Eagles would be expected to fly over the Project Area and general uncommon nature of Golden Eagle occurrence, it is anticipated that they would be unlikely to be adversely affected by the Project.

3.3 ECPG Category

Based on the Project location, the number of Bald Eagle nests within 10 miles (16 km) of the Project Area, and the results from Stages 2 and 3, while not requested or confirmed by USFWS it is possible that the USFWS would categorize the Project as Category 2 per the ECPG. A Category 2 site poses a high to moderate risk to eagles, but also carries a moderate to high opportunity to mitigate such impacts via implementation of avoidance and minimization measures (USFWS 2013).

4 Stage 4 – Avoidance and Minimization Measures

4.1 Introduction

Stage 4 of this ECP includes a review of measures that will be implemented in an effort to minimize adverse impacts to Bald Eagles and a list of other proposed conservation measures intended to minimize or mitigate the impacts to Bald Eagles.

4.2 Avoidance and Minimization Measures

The ECPG indicates that "there are no conservation measures that have been scientifically shown to reduce eagle disturbance and blade-strike mortality at wind projects" (USFWS 2013). The USFWS identified the best way to obtain needed scientific information is to work with the wind industry to develop measures for wind projects as part of an adaptive management regime and comprehensive research program tied to the take permit process (USFWS 2013).

The ECPG lists several examples of conservation measures, which are intended for the developer to consider based on Project-specific issues. Pertinent conservation measures are included here and these practices will be further developed in coordination with the USFWS and NYSDEC.

The following measures were developed to help avoid and minimize environmental impacts, including those to Bald Eagles.

Project Siting

The Project was sited in an area away from the Portage Escarpment and in such a way to minimize impacts to wetlands and other habitat that may be either directly or indirectly utilized by Bald Eagles. The Project was sited within agricultural lands to the extent practicable, thus reducing impacts to forested land. Furthermore, the Project footprint was designed to not be immediately adjacent to possible eagle foraging areas and known Bald Eagle nests.

Use of Existing Roads

Ball Hill designed the Project to use existing roadways to the extent practicable. This is anticipated to minimize the overall amount of roadkill that has the potential to attract foraging eagles. Moreover, use of existing roadways will limit impacts to habitats throughout the Project Area.

Burying Powerlines

Where feasible, collection lines will be constructed underground. In an effort to minimize potential impacts on raptors in the Project Area and minimize tree clearing, impacts on wetlands, and visual impacts, overhead electric transmission lines were eliminated from the Project design and replaced with underground medium-voltage collection lines.

Project Staff Speed Limits

A speed limit of 20 miles per hour will be established for Project turbine access roads. This practice is included in the site BBCS and is intended to reduce vehicular collisions with wildlife, thereby also reducing roadkill, which could attract foraging Bald Eagles.

Eagle Nest Monitoring

Ball Hill will continue to coordinate with NYSDEC and USFWS regarding the monitoring of the closest known Bald Eagle nest for the purpose of observing and recording any breeding activity to suggest if the nest location is active. Additionally, an environmental health and safety monitor will survey work areas in the spring and early summer in advance of construction to ensure no new eagle nests are present. As per condition 40 in Ball Hill's permit from NYSDEC:

> *If at any time during construction or operational life of the Project, a nest or roost of a bald eagle is located in the Project area or if eagles are observed in the Project Area exhibiting breeding or roosting behavior, the NYSDEC Chief Permit Administrator, Central Office, Albany, NY (CPA) and the NYSDEC Region 9 Natural Resources Supervisor (NRS) will be notified within twenty-four (24) hours of discovery or observation. Immediately upon such discovery or observation, no disturbance is permitted around the nest, roost, or area where eagles were seen exhibiting any breeding or roosting behavior. An area of one quarter (1/4) mile in radius from the nest(s) will be avoided, and an area at least six hundred sixty (660) feet in radius from the nest or roost will be posted to further halt disturbance. The nest or roost will not be approached under any circumstances, and the avoidance area will remain in place until notice to continue construction, ground clearing, grading, maintenance or restoration activities at that site is authorized by the Region 9 NRS.*

If Bald Eagles are found nesting in the immediate vicinity of a construction area, Ball Hill would identify potential impacts, evaluate options, and develop a mitigation plan to address site-specific occurrences of the eagles. Measures that may be implemented would depend on the nest's proximity to construction, the construction activities involved, the species involved, the date and stage of the breeding season, and other potential factors. Possible avoidance measures may include delaying construction until the young have fledged from the nest, monitoring during the initial construction period to ensure the birds are not impacted, or implementation of a non-disturbance buffer. Ball Hill will coordinate any such activities with the USFWS and NYSDEC.

Education

All Project personnel will be educated as to the issues that the Project could potentially have on Bald Eagles in addition to the steps that personnel will be expected to take to minimize (to the extent practicable) potential impacts to Bald Eagles, such as removal of animal carcasses and proper disposal of trash that could attract forage species. Annual wildlife monitoring and reporting training will be conducted for Ball Hill operations staff.

Carcass Removal

Animal carcasses and any animal parts (carcass remains) detected by Project personnel on roads within the Project Area will be removed immediately upon discovery to prevent the attraction of scavengers or other wildlife that may serve as prey to raptors. Ball Hill will also work with landowners to develop a plan to remove dead livestock from fields in and/or near the Project Area and to discourage "gut piles" during hunting season.

Minimize Attracting Prey

All trash and food items will be disposed of properly in predator-proof containers with resealing lids. Trash will be emptied and removed from the Project site on a periodic basis. Removal of trash from the Project site will reduce the attractiveness of the area to opportunistic predators and scavengers that may serve as prey to eagles. In addition to trash disposal, other prey attractants will be minimized when practicable, such as seeding of forbs (potential food source) below turbines and minimizing storage of Project-related equipment near turbines, which may serve as refuge for potential prey.

5 Stage 5 – Post-construction Monitoring and Continued Risk Assessment

5.1 Post-construction Monitoring

Post-construction mortality monitoring will be implemented by Ball Hill to evaluate the actual impacts of the Project on birds and bats, with attention on eagles as per the approach and objectives in Tier 4 of the *USFWS Land-based Wind Energy Guidelines* and additionally, will adhere to the objectives outlined in the ECPG and the revised technical appendices (USFWS 2012, 2013). This post-construction monitoring will assist in establishing the Bald Eagle fatality rates for the Project. Post-construction monitoring will be part of the effort indicated in the BBCS.

In addition to determining if there would be any Bald Eagle mortality as a result of the Project, post-construction monitoring will also assist in detecting and monitoring of Bald Eagle nests within the Project Area. Post-construction monitoring would begin in the first spring season following the construction of the Project and would continue for at least two years. As per condition 45 in Ball Hill's permit from NYSDEC, the Project will develop a Post-construction Avian and Bat Monitoring Plan that will be coordinated with the USFWS and NYSDEC.

5.2 Reporting

If wildlife carcasses are collected by the Project staff, Ball Hill will pursue salvage and handling permits from the USFWS and NYSDEC as necessary for the Project. Reporting to these agencies will be conducted in accordance with the specific scientific and salvage permits. Ball Hill will report the discovery of any migratory bird carcasses to USFWS law enforcement personnel. If an eagle carcass is discovered, Ball Hill will contact the USFWS and NYSDEC within 24 hours of identification. Similarly, if an eagle nest or eagle roost is discovered in the Project Area, Ball Hill will notify NYSDEC and USFWS in accordance with condition 40 of Ball Hill's permit from NYSDEC.

Ball Hill will provide a written annual report to the USFWS and NYSDEC detailing the post-construction monitoring and results following each year of intensive fatality monitoring.

5.3 Wildlife Incident Reporting System (WIRS)

A Wildlife Incident Reporting System (WIRS) will be implemented at the start of operations and remain active for the life of the Project. The purpose of the WIRS will be to standardize the actions taken by site personnel in response to wildlife incidents encountered at the Project and to fulfill the obligations for reporting wildlife incidents. The WIRS is described in more detail in the BBCS. Any incident (i.e., mortality or injury) involving a federally listed threatened or endangered species, or eagle, will be reported to USFWS within 24 hours of discovery.

6 Adaptive Management

6.1 Adaptive Management for Bald Eagles

If a Bald Eagle fatality occurs at the Project, the following actions will be taken:

1. Ball Hill will, working with a trained and permitted wildlife biologist, promptly identify and secure the carcass at the place of its discovery in the field until the USFWS or NYSDEC personnel can be reached and provide the further instruction for the storage of the carcass.
2. Ball Hill will notify the USFWS and NYSDEC within one business day after the discovery of the event.
3. Ball Hill will meet and confer with the USFWS and NYSDEC to investigate, using available data, the circumstances under which the fatality occurred.
4. Ball Hill will work with the USFWS and NYSDEC to evaluate available data concerning the event, and as appropriate, identify and implement avoidance or mitigation measures to reduce the risk of future fatalities. Possible avoidance and mitigation measures are discussed in Section 6.2.
5. Ball Hill will conduct follow-up post-construction monitoring in the season in that the fatality occurred during the subsequent year of operations to assess whether avoidance or mitigation measures are effective at reducing impacts on Bald Eagles.

6.2 Potential Adaptive Management Approaches

Avoidance and mitigation actions that may be taken under adaptive management include the following:

- Removing/modifying the source of eagle attraction;
- Implementing turbine operational protocols designed to reduce eagle fatalities and targeted to the particular issue identified during fatality monitoring;
- Implementing technological solutions. If the risk to eagles is found to be elevated to an unacceptable level and new techniques or technology become available that are cost effective and feasible to implement, Ball Hill will evaluate whether to replace or augment the measures detailed in the EMP with these new approaches; and

- Conducting additional specific, targeted monitoring to determine if adaptive management measures are effective.

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