Bluestone Wind Project

Case No. 16-F-0559

1001.22 Exhibit 22

Terrestrial Ecology and Wetlands

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EXHIBIT 22 TERRESTRIAL ECOLOGY AND WETLANDS

This Exhibit includes a review of the plant communities, vegetation, wildlife, wildlife habitat, wetlands and stream resources and potential impacts of the Facility consisting of the identification and mapping of existing conditions, an impact analysis, and proposed avoidance, minimization and mitigation measures.

(a) Identification and Description of Plant Communities

(1) Land Cover

For the purposes of the Article 10 Application, plant communities and vegetation occurring within the Facility Site were determined using National Land Cover Data (NLCD) information, which is compiled by the United States Geological Survey (USGS) (Homer et al., 2015), and verified during field surveys conducted in 2018. The Facility Site encompasses approximately 5,657 acres and is 87% forested (including deciduous forests, mixed forests, coniferous forests, and forested wetlands), as shown in Table 22-1. Approximately 7% of the Facility Site contains successional old fields that have been removed from agricultural production. The Facility Site also includes 5% or less of active agricultural land (cropland, pasture or hayfield) and disturbed or developed land, and less than 1% of coverage of open water.

Table 22-1. Land Cover Classes Found within the Facility Site

Cover	Acres	Percent Cover (%)
Forest	4900.36	86.70
Successional Old Field	404.18	7.15
Disturbed/Developed	66.12	1.17
Cropland/Hayfield	249.56	4.42
Open Water	31.62	0.01
Total	5,656.98	100.0

Source: NLCD 2011

(2) Ecological Communities

All major plant communities found within parcels that will host Facility components are common to New York State. Mixed deciduous/coniferous forestland is the dominant community type in the Facility Site, while successional old field, agricultural land, and disturbed/developed community types occur to a lesser extent. Descriptions of the ecological communities and dominant vegetation within the Facility Site are provided below for each of the land cover classes

included in Table 22-1. Detailed descriptions of wetland community types encountered during on-site wetland delineations is provided below in Section (j).

Mixed Deciduous/Coniferous Forestland

Mixed forestland constitutes the largest ecological community type within the Facility, which includes the beech-maple mesic forest and the hemlock-northern hardwood forest communities described in the *Ecological Communities of New York State* (Edinger et. al., 2014). Tree species vary based on topography and hydrology across the Facility Site, but dominant or co-dominant species in most locations include sugar maple (*Acer saccharum*), red maple (*Acer rubrum*), and American beech (*Fagus grandifolia*). Other tree species typically found in these community types include eastern hemlock (*Tsuga canadensis*), white oak (*Quercus alba*), northern red oak (*Quercus rubra*), birches (*Betula spp*.), eastern hophornbeam (*Ostrya virginiana*), white pine (*Pinus strobus*) and quaking aspen (*Populus tremuloides*). Understory trees and shrubs frequently observed in these communities include striped maple (*Acer pensylvanicum)*, dogwoods (*Cornus spp*.), hawthorns (*Crataegus spp*.), witch hazel (*Hamamelis virginiana*), and numerous saplings. Characteristic herbaceous plants include woodland ferns such as marginal wood fern (*Dryopteris magrinalis*), New York fern (*Thelypteris noveboracensis*), and interrupted fern (*Osmunda claytonia*), and a variety of flowering plants including Canada mayflower (*Maianthemum canadense*) and *Trillium* species.

Successional Old Field

As defined by the *Ecological Communities of New York State* (Edinger et. al., 2014), a successional old field is a meadow dominated by forbs and grasses that occurs on sites that have been cleared and plowed (for farming or development), and then abandoned. Within the Facility, this community is located primarily along roadsides, or adjacent to active agricultural fields. Species found in these areas typically include grasses such as orchard grass (*Dactylis glomerate*) and timothy (*Phleum pretense*), flowering plants including goldenrods (*Solidago spp*.), clovers (*Trifolium spp*.) and milkweed (*Asclepias syriaca*), and weeds such as burdock (*Arctium spp*.). Shrubs such as bush honeysuckles (*Lonicera spp*.) and *rhubus* species are also components of this community, but represent less than 50% of total vegetative cover.

Disturbed/Developed

Disturbed/developed land consists of a combination of several "cultural communities" as defined in the *Ecological Communities of New York State* (Edinger et. al., 2014). Disturbed/developed lands occur throughout the Facility, and are characterized by the presence of buildings, parking lots, paved and unpaved roads, lawns, quarries, and transmission line and pipeline rights-of-way. Vegetation in these areas is generally either lacking or highly managed (i.e., mowed lawns or routinely maintained rights-of-way). Volunteer vegetation that naturally re-

stablishes in these areas is generally sparse, and typically comprised of old field, often non-native, herbaceous species such as pokeweed (*Phytolacca americana*), bull thistle (*Cirsium vulgare*), ragweed (*Ambrosia artemisiifolia*), curly dock (*Rumex crispus*), and various upland grasses. Disturbed lands in the Facility provide ideal conditions for invasive species to establish and outcompete native species.

Agricultural Land

As defined in the *Ecological Communities of New York State* (Edinger *et. al.,* 2014), agricultural land includes cropland/row crops, cropland/field crops, and pasture land. As defined by the United States Department of Agriculture (USDA, 2007), and for the purposes of this application, agricultural land includes harvested cropland, crop failure, cultivated summer fallow, cropland used only for pasture, and idle cropland. Each of these categories consists of variation in vegetation type, intensity of agricultural operations (tillage, seeding, harvesting etc.) and overall land use. Agricultural land use within the Facility is anticipated to be row crops that are planted on tilled soil and then harvested, cover crops used to stabilize exposed soils/replenish soil nutrients/provide feedstock for livestock, and pasture land used for livestock grazing and silage production. Vegetation species found on cropland typically include either planted crops such as corn, wheat, soybeans, barley, oats, etc., or pasture crops, including timothy, rye or other perennial grasses. Pasture land is similar in vegetation composition to successional old field but will vary depending on whether it is in use for grazing or silage purposes versus a fallow or abandoned agricultural field.

(3) Map of Ecological Communities

A map of identified plant communities in the Facility Site within 500 feet of disturbance of the proposed Facility, as classified according to *Ecological Communities of New York State*, is provided in Figure 22-1 (Edinger et al, 2014).

(4) Plant Species List

Vascular plant species at the Facility Site were identified during various field studies (i.e., wetland delineations, invasive species surveys, etc.) and through incidental observations. A list of planted species identified is attached as Appendix LL; nomenclature follows the New York Flora Atlas (Weldy et al., 2017). A total of 132 unique native and non-native plant species were identified during these field surveys.

(b) Analysis of Impacts to Vegetation from Construction and Operation

(1) Permanent and Temporary Impacts

Construction and operation of the Facility will result in impacts to plant communities. These impacts include temporary disturbance due to vegetation clearing for construction, as well as permanent loss of vegetated habitats by conversion to built facilities. Permanent built facilities include turbine foundations and pads, access roads, an O&M building, meteorological tower foundations, a battery storage facility, and the collection substation. Facility-related impacts to vegetation were calculated using GIS software per the following assumptions associated with the approximate limit of vegetation clearing and approximate limit of soil disturbance for each type of Facility component, or the limits of disturbance, as identified in the Preliminary Design Drawings (Exhibit 11). These impact assumptions were used to calculate the total impact to vegetation communities that could result from Facility construction and operation, as provided in Table 22-2.

Table 22-2. Impact Assumptions.

Facility Component	Typical Area of Vegetation Clearing	Typical Area of Soil Disturbance (temporary and permanent)	Typical Area of Permanent Vegetation Loss
Wind Turbines and Workspaces	Up to 265' radius per turbine	Up to 225' radius per turbine	0.25 acre per turbine
Access Roads	Up to 75' wide per linear foot of road	Up to 60' wide per linear foot of road	16' wide per linear foot of road
Buried Electrical Collection Lines	Up to 60' wide per linear foot of line per collection line circuit	Up to 60' wide per linear foot of line per collection line circuit	0
Permanent Meteorological Towers	1 acre per tower	1 acre per tower	0.03 acre
Collection Substation	1.5 acres	1.5 acres	1.5 acres
Operation and Maintenance (O&M) Building	3 acres	3 acres	3 acres
Batch Plant	5 acres	5 acres	0
POI Substation	1.7 acres	1.7 acres	1.7 acres
Laydown/Staging Areas	10 acres	10 acres	0

A total of up to 441.2 acres of vegetation—less than 7.8% of the Facility Site—will be disturbed by Facility construction (based on area of proposed vegetation clearing and/or soil disturbance). The majority of this disturbed area (387.6 acres or 88%) will see only temporary impacts associated with collection line installation, access road and turbine construction work spaces, and construction staging. Approximately 53.6 acres of vegetation will be permanently impacted and converted to built and/or developed facilities, which represents only 0.9% of the Facility Site.

Facility-related impacts to all plant communities identified in the mapping of ecological communities described above in support of Section (a) were calculated in ArcGIS based on the above information derived from the Preliminary Design drawings. Temporary and permanent impacts to all ecological community types are provided in Table 22-3.

Table 22-3. Vegetation Impacts.

Cover Type	Temporary Impact (acres)		Permanent Loss (acres)	Total Impact (acres)
	Maintained by the Applicant[1]	Unmaintained[2]		
Beech-Maple Forest	55.9	189.0	33.5	278.4
Hemlock-Northern Hardwood Forest	23.2	75.2	10.8	109.2
Successional Old Field	1.4	1.4	0.5	3.3
Grassland	1.4	1.1	0.3	2.8
Hayfield/Pasture[3]	--	30.2	7.3	37.5
Disturbed/ Developed[3]	--	4.6	0.5	5.1
Row crops[3]	--	4.2	0.7	4.9
Total	81.9	305.7	53.6	441.2

[1] Areas where the Applicant would maintain a successional state to allow for Facility maintenance activities to be conducted. It is anticipated that all temporary vegetation impact areas within 15 feet of collection lines would be maintained. All temporary vegetation impact areas outside of this distance or otherwise not associated with collection lines would not be maintained would not be maintained.
[2] Areas not maintained by the Applicant. Unless otherwise disturbed by the landowner, these areas would likely return to their pre-disturbance state with time.
[3] Buried electrical collection line rights-of-way will not be maintained by the Applicant where they cross active agricultural or developed land, unless otherwise mandated in landowner lease agreements.

Forest clearing impacts can be characterized as one of three types. The first is permanent loss, where forested areas would be replaced with facilities and infrastructure (access roads, turbines, etc.). There is expected to be approximately 44.3 acres of forest impacted in this manner. The second is forest conversion, where forests would be cleared and maintained by the Applicant as successional communities for the life of the Facility (e.g., areas within collection line rights-of-way). This type of disturbance is anticipated to result in up to 79.1 acres of impact to forests. The third is forest recovery, where forests would be initially cleared, but these cleared areas would not

[1] Areas where the Applicant would maintain a successional state to allow for Facility maintenance activities to be conducted. It is anticipated that the electrical collection lines would be maintained (i.e., mowed) by the Applicant.

[2] Areas not maintained by the Applicant. Unless otherwise disturbed by the landowner, these areas would likely return to their pre-disturbance state with time.

be maintained and would be allowed to reforest following construction (e.g., areas along access roads and within the wind turbine workspaces. Approximately 264.2 acres of forest will be disturbed in this manner. In these areas that will be allowed to reforest, the Applicant will only remove stumps where necessary to install underground components, will not use herbicides to prevent sprouting, and will not remove trees as part of routine vegetation management during Facility operation. Following post-construction stabilization of soils, ecological succession will restore the forested condition of these areas with time.

Construction of the Facility will result in temporary disturbance of up to approximately 4.2 acres of row and field crop vegetation, and up to approximately 30.2 acres of pasture. Approximately 0.7 acres of row and field crops will be permanently lost to built facilities, along with 7.3 acres of pasture. For a detailed description of impacts to agricultural lands, please see Section (q) of this Exhibit. Construction of the Facility will result in the temporary disturbance of 2.8 acres of successional old field, 2.5 acres of grassland communities, and 4.6 acres of disturbed/developed communities. The Facility will permanently impact 0.5 acres of successional old field and 0.3 acres of grassland communities. No temporary disturbance or permanent loss of open water vegetation communities, as defined by the ecological communities mapping procedure described in Section (a) are anticipated. See Exhibit 23 Section (b)(4) for a discussion of impacts to surface waters, as defined by on-site wetland and stream delineations, anticipated as a result of Facility construction and operation. Temporary and permanent impacts to vegetation communities will not result in extirpation or significant reduction in any ecological community type.

(2) Invasive Species Identification

An invasive plant survey was conducted by EDR within all proposed areas of disturbance in June and July 2018. The purpose of the invasive plant survey was to document, prior to the start of Facility construction, the occurrence and extent of non-native invasive plant species that are listed as prohibited or regulated by the New York State Department of Environmental Conservation (2014). The results of the survey are provided in the Invasive Species Survey Baseline Report (Appendix MM) and summarized below. Some species, such as Japanese knotweed, have the ability to spread rapidly and are therefore likely to spread prior to construction. Therefore, the Invasive Species Control Plan (ISCP) (Appendix NN) includes methods for additional surveys that will be conducted within 6 months of the commencement of construction, in order to verify the distribution of invasive species prior to construction, and an updated Invasive Species Survey Report will be provided. In the case that changes in invasive plant communities are significant and thereby warrant changes to the ISCP, an updated ISCP will also be provided. A total of seven invasive species were documented within the Facility during the invasive species survey:

- Canada thistle (*Cirsium arvense*)
- autumn olive *(Elaeganus umbellata*)
- Japanese barberry (*Berberis thungbergii*)
- Japanese knotweed (*Fallopia japonica*)
- Morrow's honeysuckle (*Lonicera morrowii*)
- multiflora rose (*Rosa multiflora*)
- mugwort (*Artemesia vulgaris*)

The most common invasive plant species encountered in the Facility Site were Morrow's honeysuckle and multiflora rose, both of which thrive on the edges of forests and streams adjacent to disturbed areas. Japanese knotweed was identified primarily along roadsides within the Facility Site, with small populations also identified in disturbed areas such as quarries and pipeline rights-of-way. All other invasive species encountered were restricted to small, isolated populations within previously disturbed areas in the Facility. Individual plants or small patches of invasive species were mapped as points, and species that occurred in high densities (26-55% absolute cover) or as monocultures (>55% absolute cover), including all occurrences of Japanese knotweed, were mapped as polygons. A map depicting the distribution and density of invasive species documented within the Facility is included in the Invasive Species Survey Baseline Report in Appendix MM.

Two additional plant species were documented within the Facility Site that are not regulated or prohibited by NYSDEC as invasive species but are still considered invasive and present some level of concern. These species include wild parsnip (*Pastinaca sativa*) and reed canary grass (*Phalaris arundinacea*). Monocultures of both species were documented at the Facility Site, the largest of which were mapped during invasive plant surveys for consideration in the ISCP and are included on the map provided in Appendix MM.

There were no invasive species of insects recorded during on-site surveys, and there were no observations of dead ash trees, which would indicate the presence of emerald ash-borer. However, this invasive insect is known to occur in Broome County, and there is a possibility of infestation within the Facility Site. Therefore, measures to prevent the spread of emerald ash-borer from outside the Facility are included in the ISCP. Hemlock woolly adgelid has also been documented in Broome County, and could possibly occur within the Facility. Therefore, measures to prevent the spread of hemlock woolly adgelid within the Facility are also included in the ISCP.

(3) Invasive Species Control Plan

An ISCP for the Facility is included with this Application in Appendix NN, and was developed based on species identified during the invasive plant survey conducted in 2018. Best Management Practices outlined in the ISCP that will be implemented to control invasive plant and insect species include; measures to educate workers; measures to control the spread of invasive species including construction materials inspection, target species treatment and removal, construction equipment sanitation; and restoration. The ISCP also outlines post-construction monitoring that will take place after the Facility is operational. The goal of the ISCP is to prevent an increase in invasive species coverage within the Facility. If post-construction monitoring determines that the goal has not been met, revisions will be made to the ISCP to ensure that control measures are sufficient to prevent further spread of invasive species.

(c) Avoidance and Mitigation Measures Regarding Vegetation Impacts

Avoidance, minimization and mitigation of impacts to vegetation have been and will be accomplished primarily through careful site planning. Large areas of forest and wetland are being avoided to the extent practicable. Therefore, these ecologically valuable communities within the Facility Site will be largely protected from disturbance. Facility access roads will be sited on existing roads, farm lanes, logging roads, and transmission and natural gas pipeline rights-of-way (ROWs) wherever possible, and areas of disturbance will be confined to the smallest feasible area.

To protect adjacent undisturbed vegetation and other ecological resources, a comprehensive sediment and erosion control plan will be developed and implemented prior to Facility construction (see the Preliminary SWPPP in Appendix KK). Other mitigation measures to avoid or minimize impacts to vegetation will also include delineating sensitive areas (such as wetlands) where no disturbance or vehicular activities are allowed, educating the construction workforce on respecting and adhering to the physical boundaries of off-limit areas, employing best management practices during construction, and maintaining a clean work area within the designated construction sites. An environmental monitor will conduct inspections of all areas requiring environmental compliance during construction activities, with an emphasis on those activities that are occurring within sensitive areas, as outlined in the Environmental Construction and Monitoring Plan (EC&MP) in Appendix Q.

In addition, as previously discussed in Section (a) above, all plant communities identified within the Facility Site are common to New York State. Therefore, no impacts to unique or rare natural communities will result from Facility construction. Following construction activities, temporarily disturbed areas will be seeded (and stabilized

with mulch and/or straw if necessary) to reestablish vegetative cover in these areas. Other than in active agricultural fields, native species will be allowed to revegetate all temporarily disturbed areas.

Measures to be implemented to control the spread of invasive species coverage throughout the area disturbed by Facility construction is provided in the ISCP, as described above in Section (b).

(d) Vegetation, Wildlife, and Wildlife Habitats

(1) Vegetation

See the plant communities discussion above in Section (a) for a description of the dominant plant communities found within the Facility Site. In addition, the New York Natural Heritage Program (NYNHP) is an agency that maintains data on rare, threatened, and endangered plant and animal species, as well as significant ecological communities in the State. A site-specific request for data on rare plant species was submitted to NYNHP, and a response was received on March 23, 2017, which identified that no significant natural communities or state-listed plants are known to occur within or immediately near the Facility Site.

(2) Mammals

Publicly available information regarding the occurrence of mammalian species in the Facility Site is generally not available. Therefore, the occurrence of mammals was determined through observations of species, habitat, and signs recorded during on-site field surveys for other studies such as wetland and stream delineations. Mammal species identified during on-site surveys include woodchuck (*Marmota momax*), North American porcupine (*Erithizon dorsatum*) and white-tailed deer (*Odocoileus virginianus*). A number of common mammal species would be expected to occur within the Facility Site, including black bear (*Ursus americanus*), eastern chipmunk *(Tamias striatus*), Virginia opossum (*Didephis virginiana),* striped skunk (*Mephitis mephitis*), eastern cottontail (*Sylvilagus floridanus*) and eastern coyote (*Canis latrans*). Multiple species of bats, weasels, foxes, squirrels, and a variety of small mammals (mice, voles, moles, and shrews) are also likely to occur. A complete list of mammal species that are likely to occur in the vicinity of the Facility are included in the Wildlife Species List, provided in Appendix LL.

NYSDEC advised the Applicant that site-specific surveys for bats were not required, as pre- and post-construction studies for bats at other wind projects in the northeast provide a broad baseline of data on species distribution and temporal activity in the region. Although no site-specific surveys for bats were conducted, a number of common bat species are likely to be found in the Facility Site, including big brown bat (*Eptisicus fuscus*), hoary bat (*Lasiurus cinereus*), eastern red bat (*Lasiurus borealis*) and silver-haired bat (*Lasionycteris noctivagans*). Other bat species

that may use the Facility Site include little brown bat (*Myotis lucifugus*), small-footed bat (*Myotis leibii*), eastern pipistrelle (*Perimyotis subflavus*). According to the NYNHP review, there are no known maternity roosts, hibernacula, or critical habitat for the State-listed northern long-eared bat (*Myotis septentrionalis*). However, according to NYSDEC it is possible that northern long-eared bat may occur within the Facility Site during fall migration.

(3) Birds

The occurrence of birds in the Facility Site was determined using a variety of data collection methods and publicly available resources, including the results of on-site avian surveys conducted by Western Ecosystems Technology, Inc. (WEST) and observations made by EDR during on-site wetland and plant surveys. A review of methods and data provided by each source is provided below. All avian species identified during this review are included in the Wildlife Species List, provided in Appendix LL.

(i) Site-specific Surveys

In order to determine the type and number of bird species present within the Facility, work plans for pre-construction monitoring surveys for birds were developed by WEST in accordance with guidance provided by the U.S. Fish and Wildlife Service (USFWS) and NYSDEC. Surveys for eagles were planned specifically in accordance with USFWS *Eagle Conservation Plan Guidance* (ECPG) (USFWS, 2013) and revisions to the ECPG published in December 2016 (USFWS, 2016b), with multiple consultations with the USFWS. All work plans were reviewed and approved by NYSDEC and USFWS and included the following surveys:

- Breeding Bird Surveys conducted during the Spring of 2017
- Eagle Observation Surveys conducted for two years between March 2016 and March 2018
- Raptor Migration Surveys conducted during the fall of 2016 and spring of 2017
- Eagle Nest Surveys conducted during the spring of 2017

A summary of the methods and results of all surveys conducted by WEST for the Facility is provided in Section (h), and copies of all reports providing detailed results of each survey are provided in Appendix OO.

(ii) Public Data Sources

In addition to on-site survey data, further information on birds that may occur at the Facility Site was obtained from a number of publicly available sources. A description of sources and a summary of the data obtained from each source is provided below.

New York State Breeding Bird Atlas

The New York State Breeding Bird Atlas (BBA) is a comprehensive, statewide survey that indicates the distribution of breeding birds in the State within 5-km by 5-km survey blocks across the state (NYSDEC, 2007b). Surveys were conducted by volunteers, and the most recent data was collected between 2000 and 2005. The preliminary Facility Site is located within or immediately adjacent to 13 survey blocks, including 4466C, 4466D, 4566A, 4566B, 4566C, 4566D, 4465A, 4465B, 4565A, 4565B, 4465C, 4465D, 4565C. These blocks were queried for bird species occurrence data, and a total of 121 species were listed as having been observed within these survey blocks. Five species were unique to the BBA data, including cerulean warbler (*Setophaga cerulea*), a state-listed species of concern. Additional state-listed species recorded include one threatened species (bald eagle), and four species of concern; Cooper's hawk (*Accipiter cooperii*), northern goshawk (*Accipiter gentilis*), red-shouldered hawk (*Buteo lineatus*), and sharp-shinned hawk (*Accipiter striatus*).

North American Breeding Bird Survey

The North American Breeding Bird Survey (BBS), overseen by the Patuxent Wildlife Research Center of the USGS, is a long-term, large-scale, international avian monitoring program that tracks the status and trends of North American bird populations. Each survey route is 24.5 miles long, with 3-minute point counts conducted at 0.5-mile intervals. During the point counts, every bird seen or heard within a 0.25-mile radius is recorded. The Corbettsvile BBS route runs east-west through the central portion of the Facility. Data for this route is available for 1966-2017, and a total of 80 species have been recorded. A number of common species have been observed along the Corbettsvile route, including red-winged blackbird (*Agelaius phoeniceus*), American robin (*Turdus migratorius*), song sparrow (*Melospiza melodia*), common yellowthroat (*Geothlypis trichas*), yellow warbler (*Setophaga petechia*), and mourning dove (*Zenaida macroura*). Two state-listed threatened species have been recorded; Henslow's sparrow (*Ammodramus henslowii*) (recorded in 1969 and1986) and bald eagle (*Haliaeetus leucocephalus*) (recorded in 2011). A total of six state-listed species of special concern have also been observed along this route; common nighthawk (*Chordeiles major*), yellow-breasted chat (*Icteria virens*), vesper sparrow (*Pooecetes gramineus*), grasshopper sparrow (*Ammodramus savannarum*), red-shouldered hawk, and sharp-shinned hawk. Of these, red-shouldered hawk and sharp-shinned hawk are the only species that have been recorded in the last 10 years (USGS, 2018).

Audubon Christmas Bird Count

The Christmas Bird Count (CBC), which was created by the National Audubon Society in 1900, is the longest-running citizen science project in the country. The primary objective of the CBC is to monitor the status and distribution of wintering bird populations across the Western Hemisphere. Counts take place on a single day within a 15-mile (24 km) diameter count circle, and all bird species and individuals observed are recorded by volunteers. Since the edge of the closest count circle to the Facility Site (the Binghamton circle) is approximately 18 miles west of the Facility, data from the CBC is not applicable to the Facility Site and is therefore not included in the Application.

eBird

The eBird database, managed by Cornell University's Lab of Ornithology, is an on-line database of bird observations collected by citizen scientists around the world, and vetted by regional experts. Ebird data is used to document bird distribution, abundance, habitat use, and trends within a simple, scientific framework to help inform bird research worldwide. The main limitation of eBird data is the concentration of data on publicly-accessible lands such as state and national parks, national forest lands, and known birding hotspots. The nearest such location to the Facility Site is the Cascade Valley State Forest, located approximately 3 miles south of the Site, where a total of 73 species have been recorded by eBird users. The majority of species recorded are common to mixed forest habitats, including blackburnian warbler (*Setophaga fusca*), Canada warbler (*Cardelliina canadensis*), black-throated green warbler (*Setophaga virens*), least flycatcher (*Empidonax minimus*), and black-capped chickadee (*Poecile atricapillus*). No state-listed species have been reported in this area (eBird, 2018).

Hawk Migration Association of North America

The Hawk Migration Association of America (HMANA) is a nonprofit organization that collects hawk migration data from almost 200 affiliated raptor monitoring sites throughout the U.S., Canada and Mexico, including the Franklin Mountain Hawkwatch, located approximately 30 miles north of the Facility in Oneonta. The Franklin Mountain Hawkwatch is operated by the Delaware-Otsego Audubon Society, and fall raptor migration data is collected from late August through December. The site has operated since 1989 and has recorded an average of 4,346 raptors each year. Broad-winged hawk and red-tailed hawk are the species most frequently observed, with over 1,000 observations of each species in most years. Bald eagle and golden eagle (*Aquila chrysaetos*) are both recorded annually at the Hawkwatch site. In 2016, the most recent year for which data summaries are available, a total of 197 bald eagles and 231 golden eagles were recorded. During the month of November, the peak month for golden eagle migration, an average of 0.91

golden eagles were recorded per hour. A total of 301 sharp-shinned hawks, and smaller numbers (<100) of Cooper's hawk, northern harrier (*Circus cyaneus*), red-shouldered hawk, American kestrel (*Falco sparverius*), merlin (*Falco columbaris*), northern goshawk, and peregrine falcon (*Falco peregrinus*) were recorded during the 2016 migration (DOAS, 2017).

Raptor Studies Conducted by Delaware-Otsego Audubon Society

In addition to public records and on-site surveys conducted by WEST, additional information on raptor activity at the Facility Site was provided by the Delaware-Otsego Audubon Society (DOAS). These reports are in included in Appendix PP. Surveys were supported by intervenor funds that were provided to DOAS through the Public Service Law Article 10 review process in October of 2017. Surveys to document migrating raptors were conducted by a rotating team of nine different observers provided by the Franklin Mountain Hawk Watch. In the fall of 2017, surveys were conducted at a survey point on Cliff Road at the edge of the Facility Site. During the spring of 2018, surveys were conducted at a different survey point, located along NY State Route 241 between N Sandford Road/Loomis Hill Road and Page Pond Road. Survey methods followed raptor migration survey protocols used by HMANA, which means that surveys were conducted for full days (7-9 hours) and all raptors within the field of view were recorded, including raptors at long distances from the survey point. It is important to note that the survey point locations and methods used by DOAS vary from the surveys conducted by WEST. Most notably, surveys were conducted by DOAS from a single point each season, whereas surveys conducted by WEST were stratified at multiple locations across the Facility Site.

Fall surveys were conducted by DOAS on 23 days between October 17 and November 27, 2017 for a total of 148 survey hours. A total of 35 golden eagles and 15 bald eagles were recorded during the fall surveys. Spring surveys were conducted by DOAS for 15 days in March 2018 for a total of 105 survey hours. A total of 260 bald eagle observations and 42 golden eagle observations were made. The majority of bald eagle observations and a small number of golden eagle observations were determined to be non-migrant individuals (i.e., individuals not purposefully moving through the area), although many of these individuals are likely not year-round residents, but rather transient birds that use the area as a stopover site during migration. It is important to note that an individual eagle may have been included in multiple sightings as it left the field of view and returned to the field of view of the observer(s) during the course of a single survey. Despite differences in survey methods used by DOAS and WEST, a review of data collected by WEST in the same area of the Facility as DOAS shows that eagle use recorded by DOAS is similar to the eagle use that was recorded on-site by WEST using the data collection standards recommended by the USFWS. A

further discussion of the data collection methods and results used by DOAS is included in the Avian Risk Assessment, provided in Appendix QQ.

A total of five State listed species of concern were also observed by DOAS observers during raptor migration surveys; common loon (*Gavia immer*), Cooper's hawk, northern goshawk, osprey *(Pandion haliaetus*), red-shouldered hawk, and sharp-shinned hawk.

The fall DOAS report also includes data that was purchased with intervenor funds from Conservation Science Global, which included a series of maps illustrating the spring, fall and winter movement of golden eagles within 20 km of the Facility. The data was obtained from golden eagles fitted with satellite transmitters that sent data at intervals ranging from 30 seconds to 1 hour, which was collected over an 11-year period between 2006 and 2017. Flight paths were drawn from transmitted GPS coordinates and included the altitude of each eagle above ground level. The dataset includes movements of telemetered golden eagles in and around the Facility Site during the spring, fall, and winter. While the data shows that the Facility is located within the general path of golden eagle migration, the data indicates relatively low levels of use by golden eagles within the Facility in comparison with the adjacent landscape. In addition, flight height data indicate that many of the telemetered golden eagles in and around the Facility were recorded above the rotor swept height of the turbine models that are proposed for the Facility.

(4) Amphibians and Reptiles

Information on amphibians and reptiles for the Facility Site was compiled from the New York State Amphibian & Reptile Atlas (Herp Atlas), a 10-year survey conducted between 1990 and 1999 designed to document the geographic distribution of New York State's herpetofauna (NYSDEC, 2007a). Data from this survey was queried for the North Sanford, Windsor, Gulf Summit and Deposit USGS 7.5 minute quadrangles, which encapsulate the Facility. Information on amphibians and reptiles expected to occur within the Facility Site and an evaluation of suitable habitat for these species is provided in Section (d) above. A total of 20 amphibian species and 10 reptile species were included in the Wildlife Species List (attached as Appendix LL).

A number of amphibian species that may occur within the Facility Site rely on ephemeral water sources (vernal pools) for egg-laying and in early life stages. As such, a survey for vernal pools was conducted by EDR in May 2018 in conjunction with the on the ground wetland delineation efforts. Typical characteristics used to identify vernal pools included hydrological isolation (no permanent inlets or outlets of flowing surface water that could allow for fish to access the pool), the presence of standing water that was likely ephemeral, sparse or no vegetation

growing within pool areas, water-stained leaves observed in a depression, evidence of moss trim lines/buttressing/watermarks on nearby trees, connectivity to adjacent upland forested habitat, and the presence of amphibian indicator species in or near the pools. A total of five potential vernal pools were identified within the Facility Site (see Vernal Pool Memorandum attached to the Wetland Delineation Report in Appendix RR). Indicator species observed in or near these pools include included gray treefrog (*Hyla versicolor*), spring peeper *(Pseudacris crucifer*), green frog (*Lithobates clamitans*), and wood frog (*Lithobates sylvatica*). No signs of breeding activity, such as egg masses or larvae, were observed in any of the identified pools. However, breeding could have occurred in these pools early in the spring, prior to the start of surveys.

(5) Terrestrial Invertebrates

Publicly available data on terrestrial invertebrate species are generally not available for upstate New York. As stated above, the NYNHP is an agency that maintains data on rare, threatened, and endangered plant and animal species, as well as significant ecological communities in the State. NYNHP does track several invertebrate groups, however, not all invertebrate groups are monitored. A site-specific request for data on rare wildlife species was submitted to NYNHP, and NYNHP provided a response on March 23, 2017, which did not identify any rare, threatened, and endangered terrestrial invertebrates within the Facility Site.

Based on the size of the Facility Site and on-site observation of habitat types available, a wide range of terrestrial invertebrates are likely to occur. These include a variety of insects such as butterflies, dragonflies and damselflies, ants, bees, beetles, mosquitoes, fleas, crickets, ladybirds, fireflies, cicadas, flies, and grasshoppers. Arachnids including spiders, ticks, and mites are common throughout the Facility Site. Worms including earthworms and nematodes are common invertebrates that live in the soil. Invertebrates are important components of ecological communities within the Facility Site because they serve a variety of ecosystems services and functions, including pollination, providing prey for birds, bats, and rodents, expediting nutrient cycling, and aerating the soil. Terrestrial invertebrate species that were observed during on-site surveys are included in the Wildlife Species List, attached as Appendix LL.

(6) Wildlife Habitat

As stated above, a request for data on occurrence of significant natural communities was submitted to NYNHP, and NYNHP provided a response on March 23, 2017 that did not identify any significant natural communities within the Facility Site. In addition, the USFWS's Information for Planning and Consultation (IPaC) database was accessed on April 26, 2018 for information relative to the proposed Facility. Results from both IPAC database

reviews specifically indicate "there are no critical habitats in/at this location" (see Appendix SS for results provided by the NYNHP and USFWS databases).

The various plant communities that occur within the Facility Site as described in Section (a) above each provide habitat for different wildlife species. A discussion of habitat that is provided by each of the types of ecological communities is provided under the headings below. Ecological communities with similar habitat requirements are grouped together for discussion purposes.

Mixed Deciduous/Conifer Forest

A number of forested ecological communities are found within the Facility Site. Hemlock-northern hardwood and beech-maple mesic forests are the most widespread ecological communities within the Facility. Despite development and various land uses, many of the forests within the Facility remain intact and have large areas of interior forest. The ecological benefits of interior forests include fewer predators, darker and more protected nesting/breeding sites, less disturbance, and the wide availability of trees for nesting. State species of special concern that have been documented in forested habitats within the Facility site include broad-winged hawk, Cooper's hawk, and sharp-shinned hawk. Species of greatest conservation need (SGCN) that have been recorded include ruffed grouse (*Bonsala umbellus*), wood thrush, and scarlet tanager (*Piranga olivacea*). Mammals that may utilize forests on the Facility Site include black bear, porcupine, and white-tailed deer. Many species of bats use forest habitats for roosting and foraging. Three SGCN bat species are likely to occur in forested habitats at the Facility Site: hoary bat, silver-haired bat, and eastern red bat. One state-listed threatened species of bat (northern long-eared bat), and one state species of special concern (eastern small-footed myotis), also utilize forested habitats and may occupy forests within the Facility Site. Common amphibians such as gray treefrog (*Hyla versicolor*), wood frog (*Rana sylvatica*), and a variety of salamanders likely utilize forested habitats within the Facility Site, which rely upon the vernal pools found within these habitats for reproduction. Vernal pools are also important to amphibian species of concern such as the Jefferson and longtail salamander.

Forested Wetlands

Forested wetlands found in the Facility Site resemble red maple-hardwood swamp and silver-maple ash swamp communities. Forested wetlands provide habitat for species that prefer moist conditions, including a wide range of amphibians. Forested wetlands are also preferred habitat for a number of avian species, including belted kingfisher (*Megaceryle alcyon*) and wood duck (*Aix sponsa*). Avian species of concern that may utilize forested wetland communities include common nighthawk *(Chordeiles minor)* and red-shouldered hawk.

Successional Old Field

Successional old field communities in the Facility Site provide habitat for species that prefer open grasslands. Bird species that utilize successional old field habitats include eastern meadowlark (*Sturnella magna*), savannah sparrow (*Passerculus sandwichensis*), red-winged blackbird, eastern kingbird (*Tyrannus tyrannus*), and eastern bluebird (*Sialia sialis*). One SGCN species, bobolink (*Dolichonyx oryzivorus*), are often abundant in successional old field habitats. Successional old fields also provide habitat for game species such as woodcock (*Scolopax minor*) and white-tailed deer. A variety of moles, mice, and shrews typically use successional old field communities, which provides foraging opportunities for species of concern such as American kestrel, red-shouldered hawk, and northern harrier. Successional old field habitats typically have a high diversity and abundance of flowering forbs, which attract bees, butterflies, and other insects, and may attract foraging bats.

Cropland

Cropland communities consist of active agricultural areas of row crops, hayfields, and pasture. Active agriculture provides marginal habitat for wildlife species, as these habitats are often too disturbed for nesting and breeding to be successful. Despite this fact, a number grassland bird species utilize cropland habitats, including species of concern such as eastern meadowlark, bobolink, grasshopper sparrow, and Henslow's sparrow. Flocks of Canada geese (*Branta canadensis*) and other waterfowl often use agricultural fields as stopover sites during migration. Additionally, a number of mammal species, including white-tailed deer and black bear, forage in agricultural fields.

Non-forested Wetlands

Non-forested wetland habitats include open water, shrub-scrub wetland, deep emergent marsh, and shallow emergent marsh communities. These wetland sites support diverse communities of vegetation that provide habitat for numerous species, some of which may also use terrestrial habitat types in the Facility Site. Common waterbirds such as mallard (*Anas platyrhynchos*), great blue heron (*Ardea herodia*), belted kingfisher (*Megaceryle* alcyon), and Canada goose would be expected to use emergent wetland habitat found within the Facility. American bittern (*Botaurus lentiginosus*) and pied-billed grebe (*Podilymbus podiceps*) are two species of concern that rely on emergent wetlands, neither of which have been documented within the vicinity of the Facility, likely due to the limited size of emergent wetlands within the Facility.

Open water areas in the Facility Site provide habitat for a variety of aquatic vertebrates and invertebrates. A number of fish species are likely to be found in habitats with permanent open water. Streams provide habitat for aquatic insects that provide food for fish, such as mayflies, stoneflies, and caddisflies. Other aquatic invertebrates that could be found in these habitats include clams, mussels, and crayfish. Shallow open water bodies provide foraging habitat for bats, including species that are listed as either species of concern in New York State or species of greatest conservation need (SGCN). Frogs, toads, and salamanders may use isolated ponds within the Facility

Site as egg-laying sites, many of which use terrestrial habitats as adults. Turtles likely use slow moving streams and other open waters within the Facility Site for foraging and basking. Some species of mammals use open water communities as well, including beaver (*Castor canadensis*), muskrat (*Ondatra zibethicus*), and mink (*Neovision vision*). See Exhibit 23 for further discussion regarding aquatic habitats and aquatic species.

(7) Special Status Species

Based on surveys conducted on-site, a review of publicly available sources, and a characterization of wildlife habitats within the Facility Site, a list of special status species and their potential to occur within the Facility Site is provided in Table 22-4.

Table 22-4. New York State Special Status Species Occurring or Likely to Occur within the Facility Site

Species	NYS Status[1]	USFWS Status	SGCN Status[2]	Ecological Habitat Requirements[3] and On-site Observation Notes	Source[4]	Observed on-site?
Peregrine Falcon *Falco peregrinus*	E	N/A	SGCN	Nests in cliff and urban communities with tall structures such as bridges or buildings. Wintering and migrating birds utilize urban and open areas. Observed during raptor migration surveys.	W	Yes
Golden Eagle *Aquila chrysaetos*	E	N/A	SGCN	Found in cliff, woodland, and boreal heath communities. There are no records of the species nesting in New York State. Transient birds may utilize open habitat within the Facility Site. Observed during spring and fall migration surveys.	W	Yes
Short-eared Owl *Asio flammeus*	E	N/A	SGCN-HP	Found in cropland and successional old field communities. Limited habitat occurs within the Facility Site. There are no records of this species occurring in the vicinity of the Facility Site.	NHP	No
Northern Long-eared Bat *Myotis septentrionalis*	T	T	SGCN-HP	Found in multiple forest communities, including hemlock-northern hardwood and beech-maple mesic forests. Overwinters in caves where temperature and moisture remain even. Summer roost habitat consists of trees with cracked or exfoliating bark, and summer foraging habitat consists of forest understories. Suitable habitat is present within the Facility Site. The species has not been documented at the site or in Broome County.	FWS, NHP	No
Henslow's Sparrow *Ammodramus henslowii*	T	N/A	SGCN-HP	Found in cropland, grassland, sedge meadow, and successional old field communities. Small patches of suitable habitat occur within the Facility Site. Not observed during on-site surveys and only one old record of the species occurring near the Facility Site exists.	NHP	No
Pied-billed Grebe *Podilymbus podiceps*	T	N/A	SGCN	Found in emergent marshes and shrub swamp communities with open water. Nests in aquatic/emergent vegetation, which is limited in the Facility Site. There are no records of this species occurring in the vicinity of the Facility Site.	NHP	No
Northern Harrier *Circus cyaneus*	T	N/A	SGCN	Found in a wide range of open habitats including grassland, cropland, emergent marsh, and successional old field communities. Suitable habitat for this species occurs in small patches within the Facility Site. Observed during on-site eagle use and raptor migration surveys.	W, NHP	Yes
Bald Eagle *Haliaeetus leucocephalus*	T	N/A	SGCN	Found near open water in a wide range of forested habitats including hemlock-northern hardwood forest and beech-maple mesic forest communities. Preferentially roosts and nests in conifers or large, mature deciduous trees. Observed during eagle use and raptor migration surveys. No active nests have been identified within the Facility Site.	W, FWS, BBA	Yes
Timber Rattlesnake *Crotalus horridus*	T	N/A	SGCN-HP	Found in a number of forested habitats including hemlock-northern hardwood and beech-maple mesic forest communities. Also found in shale and talus cliff communities, which provide open rocky ledges for basking. The species has not been observed during on-site surveys, however, the species was recorded in the vicinity of the Facility Site during the NYS Amphibian and Reptile Atlas Project.	HA	No
Common Loon *Gavia immer*	SC	N/A	SGCN	Found in lake and bog communities in the northern U.S. and Canada. Winter on lakes, rivers, and coastlines. No suitable habitat is present in the Facility Site, however, the species has been observed as flyovers during raptor migration surveys.	W	Yes
American Bittern *Botaurus lentiginosus*	SC	N/A	SGCN	Found in emergent marsh communities with open water and tall, dense vegetation. Wintering birds may forage in dry grasslands and other terrestrial habitats. Limited habitat is present in the Facility Site. There are no records of the species occurring in the vicinity of the Facility Site.	FWS	No

Species	NYS Status[1]	USFWS Status	SGCN Status[2]	Ecological Habitat Requirements[3] and On-site Observation Notes	Source[4]	Observed on-site?
Red-headed Woodpecker *Melanerpes erythrocephalus*	SC	N/A	SGCN-HP	Found in orchard, red maple swamp and floodplain forest communities. Breeding habitat contains a combination of dead trees for nesting and roosting, and open ground for foraging. There are no records of the species occurring in the vicinity of the Facility Site.	FWS	No
Yellow-breasted Chat *Icteria virens*	SC	N/A	SGCN-HP	Found in old successional fields and successional shrubland communities. Also frequents powerline corridors, fencerows, forest edges, and stream/pond edges. Limited suitable habitat occurs within the Facility Site. Not observed during on-site surveys however, BBS data indicates that the species has been recorded in the vicinity of the Facility Site.	BBS	No
Golden-winged Warbler *Vermivora chrysoptera*	SC	N/A	SGCN-HP	Found in successional old field, successional shrubland, and shrub swamp communities. Often associated with regenerating clearcuts and utility right-of-ways. Suitable habitat is limited within the Facility Site. There are no records of the species occurring in the Facility Site.	BBA, BBS	No
Grasshopper Sparrow *Ammodramus savannarum*	SC	N/A	SGCN-HP	Found in cropland and successional old field communities. In New York, the species is predominantly found in hayfields. Limited suitable habitat occurs within the Facility Site. Not observed during on-site surveys, however, BBS data indicates that the species has been recorded in the vicinity of the Facility Site.	BBS	No
Wood Turtle *Glyptemys insculpta*	SC	N/A	SGCN-HP	Found in a wide range of habitats throughout the year, including hemlock-northern hardwood forest and floodplain communities. Frequently found in clean, fast-flowing streams with a rocky or sandy bottom. Suitable habitat occurs within the Facility Site. Not observed during on-site surveys, however, the species was recorded in the vicinity of the Facility Site during the NYS Amphibian and Reptile Atlas Project.	HA	No
Eastern Box Turtle *Terrapene carolina*	SC	N/A	N/A	Found in a wide range of forest habitats including hemlock-northern hardwood and beech-maple mesic forest communities Also found in grasslands in pastures. Suitable habitat occurs within the Facility Site. The species was not observed during on-site surveys.	HA	No
Red-shouldered Hawk *Buteo lineatus*	SC	N/A	SGCN	Found in moist forest habitats including floodplain, maple swamp, and shrub swamp communities. Suitable habitat for this species occurs within the Facility Site. The species was documented during eagle use and raptor migration surveys within the Facility Site.	W	Yes
Eastern Small-footed Myotis *Myotis leibii*	SC	N/A	SGCN	Found in a variety of forested habitats including hemlock-northern hardwood and beech-maple mesic forest communities. Also found in cliff and talus slope communities. Hibernates in caves, mines, and deep rock crevices. Suitable habitat for this species occurs within the Facility Site. There are no records of the species occurring at the site or in Broome County.	NHP	No
Longtail Salamander *Eurycea longicauda*	SC	N/A	SGCN	Found in stream, spring, and hemlock-northern-hardwood communities. Occurrences have been reported in Steuben County (NYS Herp Atlas). Suitable habitat for this species occurs within the Facility Site. Not observed during on-site surveys.	HA	No
Osprey *Pandion haliaetus*	SC	N/A	N/A	Found in open habitats above or adjacent to open water, including marsh and lake communities. Often builds nests above open water in submerged poles or trees. There is limited suitable habitat within the Facility Site, though the species may transiently utilize the Facility Site. Observed during eagle use and raptor migration surveys.	W	Yes
Cooper's Hawk *Accipiter cooperii*	SC	N/A	N/A	Found in a wide range of forested habitats, including hemlock-northern hardwood and beech-maple mesic forest communities. Suitable habitat for this species occurs within the Facility Site. The species was observed during eagle use and raptor migration surveys.	W	Yes

Species	NYS Status[1]	USFWS Status	SGCN Status[2]	Ecological Habitat Requirements[3] and On-site Observation Notes	Source[4]	Observed on-site?
Northern Goshawk *Accipiter gentilis*	SC	N/A	SGCN	Found in forested habitats including hemlock-northern hardwood communities. Also found in open habitats and riparian corridors. Suitable habitat for this species occurs within the Facility Site. The species was observed during on-site surveys conducted by DOAS and was recorded in the vicinity during the 2000-2005 Breeding Bird Atlas.	D	Yes
Sharp-shinned Hawk *Accipiter striatus*	SC	N/A	N/A	Found in a range of forested habitats including hemlock-northern hardwood and beech-maple mesic forest communities. Suitable habitat for this species is present within the Facility Site. The species was observed during eagle use and raptor migration surveys.	W	Yes
Common Nighthawk *Chordeiles minor*	SC	N/A	SGCN-HP	Found in a wide range of open habitats, including grassland, cliff, and urban communities. Not observed during on-site surveys, however, BBS data indicates that the species has been recorded in the vicinity of the Facility Site.	BBS	No
Cerulean Warbler *Dendroica cerulean*	SC	N/A	SGCN	Found in a wide range of mature deciduous forests including beech-maple mesic forest and maple swamp communities. Not observed during on-site surveys, however, the species was recorded in the vicinity during the 2000-2005 Breeding Bird Atlas.	BBA	No
Jefferson Salamander *Ambystoma jeffersonianum*	SC	N/A	N/A	Found in moist forest habitats including beech-maple mesic forest and maple swamp communities. Breeds in fishless ponds and vernal pools. Suitable habitat for this species occurs within the Facility Site. Not observed during on-site surveys.	HA	No
Hellbender *Cryptobranchus alleganiensis*	SC	N/A	SGCN-HP	Found in moist forests adjacent to swift-running, well-oxygenated, unpolluted streams and rivers with the presence of riffle areas and abundant large flat rocks or logs for cover and nesting sites. In New York the species is found solely in the Susquehanna and Allegheny River drainages. Not observed during on-site surveys.	HA	No
Bobolink *Dolichonyx oryzivorus*	N/A	N/A	SGCN-HP	Found in grassland, cropland, and successional old field communities. Suitable habitat is present within the Facility Site. The species was observed during on-site breeding bird surveys.	W, EDR	Yes
Eastern Meadowlark *Sturnella magna*	N/A	N/A	SGCN-HP	Found in grassland, cropland, and successional old field communities. Suitable habitat is present within the Facility Site. This species was not observed during on-site surveys, however, it has been recorded in the vicinity of the Facility Site along the nearest BBS and 2000-2005 Breeding Bird Atlas.	BBA, BBS	No
American Kestrel *Falco sparverius*	N/A	N/A	SGCN	Found in open habitats including grassland, cropland, and successional old field communities. Suitable habitat is present within the Facility Site. The species was observed on-site during eagle use and raptor migration surveys.	W	Yes
Ruffed Grouse *Bonasa umbellus*	N/A	N/A	SGCN	Found in interior forest habitats with scattered clearings within hemlock-northern hardwood and beech-maple mesic forest communities. Suitable habitat is present within the Facility Site. The species was observed during on-site surveys for breeding birds.	W	Yes
Wood Thrush *Hylocichla mustelina*	N/A	N/A	SGCN	Found in a range of forested habitats including hemlock-northern hardwood and beech-maple mesic forest communities. Suitable habitat is present within the Facility Site. The species was observed during on-site surveys for breeding birds.	W	Yes
Scarlet Tanager *Piranga olivacea*	N/A	N/A	SGCN	Found in a range of forested habitats including hemlock-northern hardwood and beech-maple mesic forest communities. Suitable habitat is present within the Facility Site. The species was observed during on-site surveys for breeding birds.	W, EDR	Yes
Silver-haired Bat *Lasionycteris noctivagans*	N/A	N/A	SGCN	A migratory bat that is found in a range of forested habitats including hemlock-northern hardwood and beech-maple mesic forest. Roosts in bark crevices and hollows. Suitable habitat is present within the Facility Site. Presence or absence of the species is undetermined, but the species is likely to occur at the Facility Site.	NHP	No
Eastern Red Bat *Lasiurus borealis*	N/A	N/A	SGCN	A migratory bat that is found in a range of forested habitats including hemlock-northern hardwood and beech-maple mesic forest. Suitable habitat is present within the Facility Site. Presence or absence of the species is undetermined, but the species is likely to occur at the Facility Site.	NHP	No

Species	NYS Status[1]	USFWS Status	SGCN Status[2]	Ecological Habitat Requirements[3] and On-site Observation Notes	Source[4]	Observed on-site?
Hoary Bat *Lasiurus cinereus*	N/A	N/A	SGCN	A migratory bat that is found in a range of forested habitats including hemlock-northern hardwood and beech-maple mesic forest. Suitable habitat is present within the Facility Site. Presence or absence of the species is undetermined, but the species is likely to occur at the Facility Site.	NHP	No
Green floater *Lasmigona subviridis*	T	N/A	N/A	A species of mussel that is found in pools and calm waters within creeks, rivers, and canals. Limited suitable habitat is present within the Facility Site. The species has been documented in the Susquehanna River, but has not been documented at the Facility Site.	NHP	No
Brook floater *Alasmidonta varicose*	T	N/A/	N/A	A species of mussel that is found in gravelly riffles within swift-moving creeks and small rivers. Rare in the Susquehanna and Delaware River watersheds. Limited suitable habitat is present within the Facility Site. The species was historically documented in the Susquehanna River, but has not been documented at the Facility Site.	NHP	No

[1] E = endangered; T = threatened; SC = species of special concern.
[2] SGCN Status refers to the species' status under the Comprehensive State Wildlife Strategy. SGCN = Species of Greatest Conservation Need, SGCN-HP = High Priority Species of Greatest Conservation.
[3] Source: NYNHP Animal Guides. Available online at http://acris.nynhp.org/animals.php.
[3] Source: W = observed on-site by WEST biologists, D = observed during DOAS raptor migration surveys, EDR = observed by EDR biologists, NHP = New York Natural Heritage Program site-specific request for data, FWS = US Fish & Wildlife Service IPaC resource list for federally-listed species, BBA = NYS Breeding Bird Atlas, HA = NYS Herp Atlas, BBS = USGS Breeding Bird Survey.

(e) Species List

A Plant Species List and a Wildlife Species List was compiled based on on-site surveys, data/reports provided by the DOAS, NYNHP, NYSDEC and USFWS, and publicly-available data from the BBA, USGS, BBS, and eBird and is included in Appendix LL.

(f) Impacts to Vegetation, Wildlife, Wildlife Habitat, and Wildlife Travel Corridors

(1) Summary

With respect to impacts to vegetation, construction and operational impacts are addressed above in Section (b) and shown in Figure 22-1. A total of up to approximately 387.6 acres (6.8% of the Facility Site) of vegetation will experience temporary disturbance as a result of Facility construction, and a total of up to 53.6 acres (0.9% of the Facility Site) of vegetation will be permanently lost through conversion to Facility components. No plant community will be extirpated or significantly reduced as a result of the Facility. Temporary and permanent disturbance to vegetation, including habitat fragmentation, will result in indirect impacts to wildlife species, and are discussed in detail below. Direct impacts to wildlife are also expected to result from construction and operation of the Facility. The Applicant has taken measures to avoid, minimize, and mitigate for impacts to vegetation, wildlife, and wildlife habitats to the extent practicable, which discussed in detail in Section (g) below. Impacts to wildlife are expected to be minimal and will not have population-level effects on any of the species that occur within the Facility, as is discussed below.

(2) Construction-Related Impacts to Wildlife and Wildlife Habitats

Construction-related impacts to wildlife are anticipated to be limited to incidental injury and mortality due to construction activity and vehicular movement, construction-related sedimentation impacts on aquatic organisms, habitat disturbance/loss associated with clearing and earth-moving activities, and displacement of wildlife due to increased noise and human activities. Each of these potential impacts is described below.

(i) Incidental Injury or Mortality

Direct impacts from construction may include incidental injury or mortalities due to construction equipment. Potential mortality is expected to be low as equipment used in wind energy facility construction generally moves at slow rates or is stationary for long periods (e.g., cranes). Incidental injury and mortality should be limited to

sedentary/slow-moving species such as small mammals, reptiles, amphibians, and invertebrates that are unable to move out of the area being disturbed by construction. More mobile species and mature individuals should be able to vacate areas that are being disturbed by construction. Vehicle-related mortality may increase temporarily due to the increased traffic during construction; however, as traffic decreases upon the completion of construction, so will wildlife-vehicle collisions.

The highest risk of direct mortality to birds from construction is the potential destruction of a nest during initial tree clearing. Significant adverse impacts to birds during construction of the Facility area are not expected, as the Applicant will conduct tree clearing outside the breeding season to the extent possible and will implement measures to avoid and mitigate potential impacts to birds that could result from tree clearing activities during the breeding season.

(ii) Habitat Disturbance and Loss Due to Clearing and Earth-moving Activities

As mentioned previously, Facility components have been sited to minimize impact to undisturbed habitat. For example, underground collection lines will parallel roads wherever possible, reducing the amount of temporary habitat loss. It is anticipated that 387.6 acres of forest, 3.3 acres of successional old field, and 2.8 acres of grassland will be directly impacted by construction-related disturbance. On a landscape scale, there is abundant availability of these habitats in the nearby landscape.

Changes in vegetation could influence the behavior of wildlife species by changing the quality of habitat for foraging, nesting, or roosting. It is anticipated that the majority of wildlife present in the Facility Site would return to areas that were temporarily disturbed following the completion of construction activity. Significant adverse impacts on bat and bird populations are not expected during construction of the Facility. To the extent possible, tree clearing will be conducted between November 1 and March 31, when bats and other mammals are in hibernation and many birds have migrated south. If tree clearing is required outside of these dates, the Applicant will implement measures to avoid and mitigate potential impacts to wildlife that could result from tree clearing, as outlined in the Net Conservation Benefit Plan for the Facility.

(iii) Displacement of Wildlife

Some wildlife displacement will also occur due to increased noise and human activity as an indirect impact of Facility construction. The significance of this impact will vary by species and the seasonal timing of construction activities. However, the species most likely to be disturbed/displaced by Facility construction include forest-interior and edge species of birds and mammals. Within New York State, peak breeding time for birds common

to agricultural, grassland, and forest habitat occurs in late spring and early summer. If construction begins before the initiation of breeding activities, then most breeding birds would likely avoid nesting in active construction areas. If construction begins during the breeding season, the breeding birds that are accustomed to similar disturbances such as farming and logging, are expected to remain in the area while others will likely relocate to adjacent suitable habitat. These impacts are not expected to be significant because of a sizeable amount of suitable habitat will remain undisturbed within and adjacent to the Facility Site. Outside of localized displacement due to construction disturbance in the immediate vicinity of turbines, access roads, etc., no significant displacement impacts on wildlife species are anticipated during construction.

(3) Operation-Related Impacts to Wildlife and Wildlife Habitats

Operation-related impacts to wildlife include direct habitat loss, habitat degradation through forest fragmentation, disturbance/displacement due to presence of wind turbines, and avian and bat mortality as a result of collisions with operating turbines.

(i) *Habitat Loss*

A total of 53.6 acres of wildlife habitat will be permanently lost from the Facility Site (i.e., converted to roads or built facilities) (see Table 22-5). This habitat loss represents only approximately 0.9% of the 5,652-acre Facility Site. Approximately 1% of this loss (approximately 0.7 acres) will occur in row and field crops, which have limited wildlife habitat value. Facility construction will result in a temporary loss of approximately 387.6 acres of habitat. Of this, approximately 79.1 acres of forest are expected to be converted to a successional community (old field, shrubland, or saplings) for the life of the Facility. This will result in an increase in habitat for early-successional species, many of which are in decline. Given the relatively small area of lost or converted natural communities, habitat loss/conversion resulting from Facility development is not considered significant.

(ii) Forest/Grassland Fragmentation

Fragmentation may affect the movement, breeding, roosting, or nesting behavior of birds and bats across the landscape, which could degrade overall habitat suitability and result in reduced reproductive success. Fragmentation can occur at a variety of scales and patterns, and may affect species differently depending on their habitat requirements. The potential effects of habitat fragmentation depend in part on previous land use, the original extent of intact forested habitat, how much habitat will be impacted during and after construction, and the behavioral sensitivity of potentially affected species or species group. The relative impacts of habitat removal or conversion also depend on the configuration of impacted areas, the current level of habitat

degradation or disturbance, and types and levels of activity (e.g., traffic volume, noise levels, visual disturbances) to occur in the affected areas. In order to assess forest fragmentation impacts to songbird and bat populations as a result of construction and operation of the Facility, WEST performed a fragmentation analysis that provided an overview of habitat fragmentation effects, quantified the acreage of forest anticipated to result in edge effects, and assessed potential impacts of fragmentation to state-listed species. The Habitat Fragmentation Analysis is attached as Appendix TT and summarized below.

Fragmentation Impacts to Birds

Sensitivity to habitat fragmentation varies by species, with forest interior species showing the highest degree of sensitivity (Bannerman 1998). Forest interior habitat located deep within woodlands has a relatively stable climatic environment with dense vegetation and woody debris that provides shelter and concealment from predators. As forests are cut, edges are created, which results in increased exposure to wind, sun, and predators. Some species of birds benefit from the creation of edge habitat, these species are typically habitat generalists that are adapted to use the variety of vegetation and food resources located within the forest edge.

Despite the fact that forests within the Facility are already fragmented, several forest interior avian species were observed during breeding bird surveys, including red-eyed vireo, ovenbird, scarlet tanager, wood thrush, and hooded warbler. These species have shown decreased reproductive success due to fragmentation in some studies (Donovan and Flather 2002, Robinson et al. 1995). Species that nest on the ground or low in the understory, such as ovenbird, veery and black-throated-blue warbler, are particularly vulnerable to the effects increased predation resulting from forest fragmentation. However, these species are common species in the landscape and population-level effects are unlikely to result from the construction of the Facility.

While there is little information available on the effects of forest clearing for wind energy development to eastern forest birds, forest edge created by the development of roads and powerlines has been shown to result in a decreased presence of forest interior bird species. However, narrow openings created within larger forested areas, such as roads, appear to have a more limited effect with less reduction in use by forest dwelling species and no significant reduction in nest success (King and DeGraaf 2002, Ortega and Capen 1999, Askin 1994). The primary impact from construction of the Facility is likely an increase in predator activity along forest edges, which may result in increased nest predation and brown-headed cowbird (*Molothrus ater*) parasitism. However, other species that use brushy habitats or edges may be positively affected by increased edge created as a result of Facility construction. Forest edges typically have a higher diversity of vegetation than interior forests, which can result in an increased diversity of wildlife species. Considering only 4.2% of forested habitat at the local-level is expected to be cleared for construction and that the landscape consists of a

patchwork of forested and non-forested habitat, it is unlikely that the Facility will cause significant forest fragmentation impacts to bird communities.

Facility construction is also expected to result in a loss of 5.3% of grassland habitat (herbaceous) at the local-level. However, habitat fragmentation impacts to grassland birds are not expected to be significant given the negligible amount of grassland habitat present within the Facility, and grassland at the local level and is already subjected to fragmentation from development. At the landscape level, habitats similar to those within the Facility are abundant within the surrounding landscape thus allowing birds to alternatively use these areas during construction and operation of the Facility.

Fragmentation Impacts to Bats

Forested fragmentation effects on bats are not well understood and effects may be different between species based upon each species' ecology (e.g., preferred prey, foraging areas, roosting needs, and flight morphology). Direct take of bat species during Facility construction is expected to be very unlikely as the Applicant will implement measures to minimize bat take. To the extent possible, tree clearing for the Facility will take place during the winter when bats are hibernating or have migrated south, and minimization measures to avoid direct take of bats will be implemented for all tree clearing that occurs outside of this time period. Indirect impacts to bats may occur as a result of habitat loss, however, given the small percentage of forested habitat loss at the local scale, it is unlikely that habitat fragmentation will have a significant impact on any bat species. Suitable roosting areas for some species may be lost as a result of Facility construction; however, the creation of open areas and forest edge may actually benefit some species (such as little brown bat and big brown bat) by increasing foraging opportunities. Overall, it is unlikely that habitat fragmentation as a result of Facility construction will have a population-level impact on any bat species.

(iii) Disturbance/Displacement of Wildlife

Habitat alteration and disturbance resulting from the operation of turbines and other wind farm infrastructure can make a site unsuitable or less suitable for nesting, foraging, roosting, or other wildlife use. The footprint of turbine pads, roads, and other Facility infrastructure represents a very small percentage of the Site following construction. Therefore, overall land use is relatively unchanged by wind power development. However, the true amount of wildlife habitat altered by a wind power facility can extend beyond the functional footprint, due to the presence of tall structures and increased human activity. An analysis of potential impacts to avian wildlife that may result from Facility construction was conducted by WEST and presented in the Avian Risk Assessment for the Bluestone Wind Project report, provided in Appendix QQ. The following subheadings

address potential disturbance/displacement impacts discussed in the report in relation to breeding birds, waterbirds, raptors, and game species.

Breeding Birds

While the majority of the Facility components will be located in forested habitats, the potential impacts of the Facility on forest-breeding birds should not be significant. Disturbance and displacement is primarily caused by construction activities, and research has found that these effects are usually temporary and bird diversity rebounds over time. The fact that forest and forest edge birds are familiar with tall features (i.e., trees) in their habitat is thought to be a reason for the adaptability of many forest species to the presence of wind turbines (Kerlinger and Guarnaccia, 2009).

A review of available post-construction studies indicates that there is some level of displacement of breeding birds in locations that are in close proximity to operational turbines; however, most of the displacement studies have been in grassland habitats where small displacement effects from approximately 100 m (328 ft) to 200 m (656 ft) have been reported (see for example Johnson et al. 2000, Leddy et al. 1999, Osborn et al. 1998). Displacement impacts to grassland species are expected to be minimal due to the limited amount of grassland habitat in the Facility (0.01% of local area; see Habitat Fragmentation Analysis).

There is little information available on indirect effects from wind turbine facilities on eastern forest birds. In a forested setting, breeding bird surveys conducted prior to, during, and after construction of the Green Mountain Power Corporation's Wind Power Facility in Searsburg, Vermont, the same diversity of species was detected during three survey periods following construction of the project; however, abundance and frequency of species occurrence at the study sites changed over the three periods (Kerlinger, 2002). The study found that abundance of forest interior species declined, while abundance of habitat generalists increased from that documented during preconstruction studies. At the Marble River Wind Farm, which is located in northeastern New York in an agricultural and forested setting, surveys to monitor breeding bird avoidance of turbines indicated there may have been some avoidance by bird species; however, the overall results were inconclusive as no consistent trends were detected across bird types or species (Bay et al., 2015).

Some degree of displacement to breeding birds in the direct vicinity of turbines is anticipated for certain species as habitat will be altered and human activity will increase. Bird species documented during the breeding bird surveys in the Facility Site such as red-eyed vireo, ovenbird (*Seiurus aurocapilla)*, black-throated green warbler, and Canada warbler have shown sensitivity to disturbance from wind energy development (Kerlinger, 2002). However, given the small amount of habitat in which displacement could occur compared

to the total habitat available in the area surrounding the Facility, such displacement is not expected to adversely affect the viability of local populations. Additionally, if individuals of these species are displaced from the Facility Site, it is unclear if displacement impacts would persist for the life of the Facility, given that some research shows that many species will habituate to the presence of turbines.

Although studies on the effects of bird displacement at wind energy facilities are limited, in particular for forested regions, most suggest indirect effects to be negligible or immeasurable. Additionally, reduced attractiveness of the area around turbines could be considered beneficial, as decreased use may reduce exposure to turbines and collision risk.

Waterbirds

Potential displacement impacts to waterfowl, waterbirds, and shorebirds from Facility operation are not expected to be significant. Open water habitats preferred by these species are limited within the Facility Site, with Sky Lake, Deposit Reservoir, and Marsh Pond providing the majority of suitable waterfowl habitat. Wind turbines have been sited in upland habitats away from these water bodies, and there will be no loss of open water wetlands as a result of Facility construction. See Exhibit 23(b)(4) for a discussion of impacts to surface waters, as defined by on-site wetland and stream delineations, anticipated as a result of Facility construction and operation.

Some species of waterbirds, primarily migrating geese, may forage in upland farm fields within the Facility Site. However, these birds are generally well-adapted to disturbed environments with heavy human influence such as along highways, in busy public parks, and on golf courses. Therefore, disturbance/displacement impacts to these species are not expected as a result of operating wind turbines.

During on site pre-construction surveys, overall use by waterfowl, waterbirds, and shorebirds was low and Canada goose comprised the majority of observations in these groups. In addition, two years of post-construction surveys at a wind farm in Iowa that experienced high use by waterfowl due to its proximity to three wildlife management areas showed no displacement of waterfowl (Jain 2005). Based on these study results and the lack of preferred habitat present, the Facility is not anticipated to have significant displacement impacts to waterfowl, waterbirds, and shorebirds.

Raptors

A review of available research studies on raptor displacement at wind energy facilities conducted by WEST for the Avian Risk Assessment (Appendix QQ) indicates that displacement effects have been shown to be

negligible in most studies. Notable exceptions include a study in Scotland that described territorial golden eagles avoiding the entire wind energy Facility Site, except when intercepting non-territorial birds (Walker et al., 2005). Northern harriers and buzzards (*Buteo buteo*) showed reduced flight activity around turbines at a wind energy facility in Europe (Pearce-Higgins et al., 2009). A study in Wisconsin found that raptor abundance was 47% less post-development compared to pre-construction levels; however, whether this possible displacement effect will remain constant over time, become more pronounced, or decrease through habituation was unknown (Garvin et al., 2011). Finally, a study at the Buffalo Ridge wind energy facility in Minnesota found evidence of northern harriers avoiding turbines in the year following construction, however, no large-scale displacement was detected two years after the facility was built, indicating that the species may have habituated to the facility (Johnson et al., 2003).

Avoidance of wind turbines by nesting raptors has only been reported in one study (Usgaard et al. 1997), while several studies have shown no avoidance behavior by nesting raptors (Erickson et al. 2004; Johnson et al. 2000, 2003). Avoidance behavior by nesting raptors was documented at the Buffalo Ridge facility in Minnesota, where raptor nest density was higher on land surrounding the wind energy facility than within the facility, even though habitat was similar (Usgaard et al. 1997). However, the analysis assumed that raptor nests are uniformly distributed across the landscape, which is not usually the case. Displacement of raptors that breed in forested habitats, such as red-tailed hawk, broad-winged hawk, and Cooper's hawk, may be displaced into nearby habitats if construction or operational activities occur near nesting sites, however, these impacts are unlikely to have a population-level effect on these common species. Further, multiple studies have documented raptors nesting and successfully fledging young within one mile of wind energy facilities (Erickson et al., 2004; Johnson et al,, 2000).

Game Species

While habituation to the presence of the turbines may not be immediate, game species such as deer and wild turkey generally adapt quickly to the presence of man-made features in their habitat (as evidenced by the abundance of these species in suburban settings). Significant displacement of game species from a wind power site is not expected to be an issue; the Applicant's consultant has witnessed substantial numbers of deer and turkey foraging in open fields directly adjacent to and beneath operating wind turbines at several New York wind power sites.

(iv) Avian Collision Risk

Turbines pose a collision risk for birds and every wind energy facility in the U.S. likely results in some bird mortality. Avian fatality rates have been fairly consistent across the U.S. at most wind energy facilities that have been studied with appropriate methods. Evaluation of 63 studies across the U.S. of avian fatality estimates at 36 projects shows that fatality rates ranged from less than 0.50 birds/MW/year to approximately 14.0 birds/MW/year, with 42 of the 63 studies reporting bird mortality rates of 3.0 birds/MW/year or fewer. In the northeastern US (New York, Maine, New Hampshire, Maryland, and Pennsylvania) avian fatality rates have ranged from 0.7 birds/MW/year to 6.95 birds/MW/year at 25 wind energy facilities and at 10 facilities in New York bird fatality rates have ranged from 0.83 birds/MW/year to 2.66 birds/MW/year.

Breeding Birds

Collision risk varies between avian species based on abundance, use of habitat, and behavior. Passerines (songbirds) account for the highest percentage of wind-related fatalities in the U.S. and the northeast, with nocturnal migrants accounting for the majority of fatalities. A review of post-mortality data from 30 wind facilities in the northeast U.S. and southern Ontario found that passerines comprise 71.8% of all fatalities. Bird fatality rates have been observed to peak during the spring and fall migration seasons at most wind energy facilities, with lower numbers of fatalities occurring during the breeding season (Erickson et al., 2014).

Large-scale night migration-related mortality events are rare at wind energy facilities, and the few large-scale mortality events documented have been determined to be due to improper lighting (e.g,. upward facing lights at substations, lights left on in nacelles, etc.). Minimization measures for facility lighting have since been developed to minimize such avian attractants, and provided the Facility implements these measures (downward facing and motion-activated lights as practicable, intermittent FAA lighting, leaving lights off in nacelles, etc.), large-scale migration-related collision risk is expected to be low for migratory landbirds in the Facility.

Waterbirds

Although waterfowl, waterbird, and shorebird mortality at wind energy facilities has been highly variable, national research has demonstrated that these groups rarely collide with inland turbines. Waterbirds have been found to comprise only 4% of all fatalities in the northeastern U.S., based on a review of post-construction mortality data from 30 wind facilities. The relatively low percentage of waterfowl fatalities has been consistent in fatality studies for wind energy facilities throughout the U.S. At Top of Iowa Wind Farm located in Worth County, Iowa, no turbine-related waterfowl or shorebird mortality was documented during two years of post-

construction monitoring, even though the facility experiences very high use by waterfowl and shorebirds (Koford et al., 2005).

During on-site surveys conducted at the Facility, waterbird, waterfowl, and shorebird use was mostly comprised of Canada goose observations, with all other species observed in relatively low numbers. While the Facility will expose low numbers of waterbirds, waterfowl, and shorebirds to risk from the turbines, the available data suggests that impacts will be low generally due to low collision impacts for these bird types and generally low use of the Facility.

Raptors

The raptor migration surveys completed by WEST and DOAS showed significantly lower numbers of raptor observations per hour during fall migration compared to data collected during nearby at HMANA raptor migration survey locations. Raptor observations per hour at nearby HMANA sites range from 7.24 raptors/hour (hr) at Franklin Mountain to 18.59 raptors/hr at Waggoner's Gap, while fall raptor migration rates recorded by WEST and DOAS were 0.46 and 1.35 raptors/hr, respectively. Raptor migration rates recorded by WEST and DOAS during migration surveys conducted in the spring (1.43 and 1.04 raptors/hr, respectively) were also well below raptor migration rates recorded at spring HMANA sites (5.17 raptors/hr at Tussey Mountain and 6.01 raptors/hr at Hawk Mountain). In a review of post-construction mortality data from 30 wind facilities in the northeastern U.S. and eastern Canada, raptors comprised only 4.2% of observed mortality. In New York State, post-construction monitoring data available from ten facilities revealed that raptor mortality averaged 0.12 raptors/MW/year and ranged from zero to 0.59 raptors/MW/year. Given the results of raptor use studies conducted at the Facility indicating relatively low use of the area by migrating raptors compared to nearby sites, and the results of mortality monitoring studies at other New York wind facilities, raptor fatality rates at the Facility are expected to be similar to those at other northeastern wind facilities and are not expected to adversely impact any raptor species at a population level.

Based on eagle use data collected on-site and a review of publicly available information, there is a low risk of turbine collisions for bald eagles. Bald eagles commonly soar at high altitudes while foraging, well above turbine blade heights, but they occasionally flap low over treetops near waterbodies and marshes when foraging, potentially putting them in the rotor-swept area of operating turbines (NYSDEC 2016a). However, the absence of large water bodies in the Facility Site reduces the likelihood of collisions due to this behavior. In a review of publicly available post-construction monitoring reports from 28 facilities, no bald eagle fatalities were reported during post-monitoring surveys. Additionally, raptor migration surveys show that raptor pass rates recorded on-site are considerably lower than pass rates recorded at nearby HMANA survey sites. Based on the biology of

the species, the results of on-site eagle use surveys, and the fact that no bald eagle fatalities have occurred in the northeastern U.S., estimated bald eagle take as discussed in the Net Conservation Benefit Plan is expected to be low. Although the risk of bald eagle collisions is low, potential impacts to the species will be offset by mitigation and there will be a net conservation benefit to the species.

Based on eagle use data collected on-site and a review of publicly available information, there is a low risk of turbine collisions for golden eagles. No golden eagles are known to nest in New York, as the eastern population of golden eagles breeds in Canada and primarily winters in central and southern portions of the eastern U.S. Therefore, the primary times that golden eagles may occur over the Facility Site are during spring and fall migration as demonstrated by data collected during on-site surveys for the Facility. Raptor migration surveys show that raptor pass rates recorded on-site during spring and fall migration are considerably lower than those recorded at nearby HMANA raptor migration survey sites, specifically the Franklin Mountain HawkWatch, which records large concentrations of migrating golden eagles in the fall. In a review of publicly available post-construction monitoring reports from 28 facilities, 49 golden eagle fatalities were identified during standard monitoring surveys; however, none have been reported in the northeastern U.S. Based on the seasonality of golden eagle use, the absence of nesting eagles in New York State, and the fact that there have been no golden eagle fatalities in the northeastern U.S., estimated golden eagle take as discussed in the Net Conservation Benefit Plan is expected to be low. Although the risk of golden eagle collisions is low, potential impacts to the species will be offset by mitigation and there will a net conservation benefit to the species (see [f] below for a discussion of mitigation measures).

(v) Bat Collision Risk

Wind energy development has shown to result in higher direct impacts to bats than birds, with an estimated 50,000 bats killed annually by wind turbines. Fatality estimates across the U.S. range from less than 1 bat/MW/year to 70 bats/MW/year. A study of 24 wind facilities in the northeastern U.S. found that bat fatalities ranged from 0.12 to 21.4 bats/MW/year. On a state level, bat mortality ranged from 1.78 to 16.3 bats/MW/year, or an average of 6.05 bats/MW/year. Collision risk is highest for migratory, tree-roosting species of bats (hoary, silver-haired, and eastern red bat), which account for an estimated 75% of all bat fatalities. However, impacts to bats will be reduced by the implementation of minimization and mitigation measures.

(vi) Impacts to Wildlife Travel Corridors and Wildlife Habitat

The Applicant conducted research to determine the presence of documented wildlife travel corridors within or adjacent to the proposed Facility, and none were identified. Smaller scale travel corridors that are used for local movement between resource patches likely exist within the Facility Site. These include deer trails, areas

between wetlands and uplands that reptiles and amphibians cross in order to access breeding grounds, and patches of forest that mammals may travel through while foraging.

While no wildlife concentration areas have been identified within the Facility Site, potential wildlife concentration areas are in proximity to the Facility, including to two Important Bird Areas (IBA), which have been identified by the National Audubon Society as places that provide important habitat for birds. The Facility is located less than one mile west of the Catskills Peaks Important Bird Area, which includes one of the state's largest contiguous forest tracts. Numerous species of birds are known to occur within the IBA including the state threatened bald eagle, and state species of special concern cerulean warbler, Cooper's hawk, northern goshawk, osprey, red-shouldered hawk, and sharp-shinned hawk, which have all been recorded during the breeding season. The Facility is also located just outside the western border of The Upper Delaware Scenic River IBA. This state-level IBA runs approximately 140 mi along the Delaware River and consists of riparian habitat, woodland, fields, young scrub, hillsides, and some upland wetlands. The Upper Delaware Scenic River IBA is an important area for migrating and wading bird species and is a major bald eagle wintering site with as many as 40 bald eagles documented in during the winter months.

Three State Forest Reforestation Areas are located near the Facility Site: Cascade Valley State Forest, and a portion of the Marsh Pond State Forest and Page Pond State Forest. These properties are managed by the State to provide healthy and biologically diverse ecosystems, maintain human-made forest assets, provide recreational opportunities, and provide economic benefits. No other possible wildlife concentration areas are located within 20 mi (32.2 km) of the Facility Site.

The proposed Facility is not expected to have any impacts to wildlife travel corridors or concentration areas, as neither type of wildlife habitat has been identified within the Facility Site.

(4) Impacts to Wildlife from Application of Biocides

Per the terms of landowner lease agreements, the Applicant is not permitted to apply pesticides, herbicides, or biocides without the consent of the landowner. Therefore, it is anticipated that no biocides will be used within the Facility.

(5) Summary of Impacts to Wildlife Habitat

A summary impact table quantifying anticipated temporary and permanent impacts to wildlife habitats and vegetation cover types associated with the construction and operation of the Facility is provided in Table 22-5.

Table 22-5. Impacts to Wildlife Habitat

Cover Type[1]	Temporary Impact (acres)		Permanent Loss (acres)	Total Impact (acres)
	Maintained by the Applicant[2]	Unmaintained[3]		
Beech-Maple Forest	55.9	189.0	33.5	278.4
Hemlock-Northern Hardwood Forest	23.2	75.2	10.8	109.2
Successional Old Field	1.4	1.4	0.5	3.3
Grassland	1.4	1.1	0.3	2.8
Hayfield/Pasture[4]	--	30.2	7.3	37.5
Row crops[4]	--	4.2	0.7	4.9
Open Water	0	0	0	0
Total	81.9	301.1	53.1	436.1

[1] Only vegetative communities identified in 1001.22(a) that provide wildlife habitat are included in this table. Disturbed/developed cover types were excluded. See Table 22-7 for impacts to wetland habitat types.
[2] The Applicant would maintain a successional state in some areas to allow for Facility maintenance activities to be conducted. It is anticipated that all temporary vegetation impact areas within 15 feet of collection lines would be maintained. All temporary vegetation impact areas outside of this distance or otherwise not associated with collection lines would not be maintained.
[3] Areas not maintained by the Applicant. Unless otherwise disturbed by the landowner, these areas would likely return to their pre-disturbance state with time.
[4] Buried electrical collection line rights-of-way will not be maintained by the Applicant where they cross active agricultural land, unless otherwise mandated in landowner lease agreements.

(i) Information Regarding Threatened, Endangered, and Special Concern Species

The Applicant compiled a list of federally and state-listed species that could occur in the Facility Site based on site-specific correspondence and database queries from USFWS, NYNHP, NYSDEC state and regional offices, and direct observations made on-site. The USFWS maintains an online database called IPaC (Information for Planning and Consultation) where users can request site-specific information for known occurrences of federally-listed threatened, endangered, and candidate species listed under the Endangered Species Act. NYNHP tracks threatened, endangered, and special concern plant and animal species that occur throughout the state, as well as ecological communities that are unique or of special ecological significance. The Applicant requested site-specific data from these sources to determine the presence of threatened, endangered, candidate, or special concern species that may occur in the Facility Site (see Appendix SS). See Table 22-4 in Section (d) above for

a list of all special status species identified, a brief description of the ecological requirements of each species, the source whereby each species is known to occur within the vicinity of the Facility Site, and whether the species was observed during on-site surveys.

From the above sources, it was determined that one federally-listed species could occur within vicinity of the Facility Site, the northern long-eared bat. This species is a federally-listed threatened mammal that is also state-listed as threatened and a High Priority SGCN.

State-listed species identified by the sources above or during on-site surveys included three state-listed endangered bird species (peregrine falcon, golden eagle, and short-eared owl) and four state-listed threatened species (pied-billed grebe, least bittern, northern harrier, bald eagle and Henslow's sparrow).

The NYSDEC also keeps records on species of special concern (SSC). These species are not listed, but their conservation needs do "warrant attention and consideration" (NYSDEC, 2017a). A total of 13 avian state-listed species of concern were identified through site-specific correspondence with the above sources, direct observation on-site, or review of other sources used to prepare the Wildlife Inventory as discussed in Section (e)(2). These species included American bittern, cerulean warbler, common loon, common nighthawk, Cooper's hawk, red-headed woodpecker, grasshopper sparrow, northern goshawk, osprey, red-shouldered hawk, sharp-shinned hawk, vesper sparrow, and yellow-breasted chat.

New York State maintains a Comprehensive State Wildlife Strategy that includes a list of Species of Greatest Conservation Concern (SGCN) (NYSDEC, 2017b). This list describes species that are rare or declining. Species listed as High Priority Species of Greatest Conservation Need (SGCN-HP) are in need of timely management intervention to avoid reaching critical population levels in New York, specifically needing conservation actions within the next ten years. Species of Greatest Conservation Need (SGCN) are species that are experiencing some level of population decline and need conservation actions to maintain stable populations or sustain recovery. However, the need for conservation action is not as imperative as for those in the High Priority category. Many of the species listed as threatened, endangered, or of special concern are also identified as SGCN or SGCN-HP. There are nine SGCN or SGCN-HP species that have been observed within or near the Facility Site that are not also listed as threatened, endangered, or of special concern.

A description of impacts to threatened, endangered, special concern, and SGCN species for which some level of impact is expected is provided in the following sections. A summary of impacts for these species is provided in Table 22-6. Note that some species listed in Table 22-3 are not expected to be impacted at all by Facility

construction or operation, because they either do not occur at the Facility, or occur so rarely as to not be detected during on-site surveys, and as a result were excluded from Table 22-6.

(ii) Impacts to Special Status Plants and Significant Ecological Communities

No threatened, endangered, candidate, or rare plant species and no significant ecological communities were identified by either the USFWS or the NYNHP. In addition, no special status plants or significant ecological communities were observed on-site during ecological surveys. Therefore, Facility construction and operation are not expected to result in adverse impacts to protected plants or to significant ecological communities.

(iii) Impacts to Special Status Birds

As noted in Section (d) above, a number of special status species have been identified as occurring or having the potential to occur at the facility site. Potential impacts to these species resulting from Facility construction and operation are discussed below.

Henslow's Sparrow

Based on NYNHP records, the state-threatened Henslow's sparrow has been documented within 16 km of the Facility Site. Henslow's sparrow is a grassland species that typically prefers grassy fields and meadows with scattered bushes and herbaceous plants, as is typically found in weedy hayfields and pastures or successional old fields (NYNHP, 2017c). Although initial disturbance is predicted to remove some hay/pasture habitat from the landscape, the revegetation of cleared land with planted grasses may actually increase the amount of suitable breeding habitat after initial construction disturbance in the Facility Site. However, no Henslow's sparrow were documented during on-site pre-construction surveys and there are no recent public records of the species. Therefore, no direct or indirect impacts are expected to result from Facility construction or operation.

Bald Eagle

The NYNHP review identified the state-threatened bald eagle as occurring within 16.1 km (10 mi) of the Facility. Additionally, bald eagles were regularly observed during pre-construction raptor surveys for the Facility. Some displacement of bald eagles may occur due to construction and operation as some studies have shown that bald eagles tend to avoid development. However, the bald eagle population continues to increase rapidly in New York and the species has been observed using and showing compatibility in areas with higher human presence. Suitable foraging habitat within the Facility is limited, and more suitable foraging habitat (large lakes and rivers) is found outside of the Facility Site. Indirect impacts to potential bald eagle

foraging areas are expected to be minimal as Facility components will be sited in upland areas and there will be no loss of open water wetlands. Indirect impacts to nesting bald eagles are also expected to be minimal as the nearest bald eagle nest site is more than 3 miles from the Facility. Bald eagles are more likely to nest outside of the Facility along the Susquehanna River and Cannonsville Reservoir as these areas provide more suitable nesting locations and foraging opportunities than habitats within the Facility. Pre-construction surveys of eagle use of the Facility indicate there is a low risk of direct impacts to bald eagles from turbine collisions. Further discussion of potential impacts to bald eagles from Facility construction and operation are discussed in Section (f).

Golden Eagle

As noted in previous sections, the golden eagle is a state-listed endangered species that may be impacted by the Facility. During on-site surveys, golden eagles were only recorded during spring and fall migration, and only 27 observations were recorded of golden eagles flying within the rotor-swept area over a two-year period. Facility construction is anticipated to have minor impacts on golden eagle populations, as the species is largely absent from the region outside of the migration period. Potential indirect impacts due to Facility operations could include displacement, as some research indicates that individuals may adjust migration routes due to the presence of turbines. Pre-construction surveys of eagle use at the Facility indicate that there is a low risk of direct impacts from turbine collisions. Further discussion of impacts to golden eagles and mitigation measures that will be implemented to offset estimated take are discussed in Section (f).

Northern Harrier

The state threatened northern harrier was not identified as potentially occurring within the Facility Site during agency correspondence; however, only 22 observations were recorded during eagle use and raptor migration surveys conducted over two years by WEST. Northern harriers primarily occupy large, open wetlands and grasslands, and will nest in a variety of habitats including fields, grasslands, meadows, marshlands, and other open habitats with little or no woody vegetation. Indirect impacts to breeding northern harriers due to habitat loss are not expected as the Facility Site is highly forested and there are no large open areas present for nesting. In addition, no northern harriers were observed during breeding bird surveys in the Facility Site. As discussed in Section (f), studies have shown some indirect displacement impacts to northern harriers from wind energy development; however, large-scale displacement has not been observed.

A review of publicly available data indicates that northern harriers appear to be at low risk of collision with wind turbines, as they are rarely found as fatalities at wind energy facilities where the species is often observed. The hunting habits of northern harriers typically involve low, coursing flights over grassland habitats,

which likely decreases the potential for this species to collide with a wind turbine. Northern harriers may fly higher when conducting aerial courtship displays or during migration, however, data collected during the raptor migration surveys in the Facility Site indicate that this is a relatively uncommon event in the Facility (72.3% of flights recorded were below the rotor swept zone). Additionally, no northern harrier fatalities have been reported at wind energy facilities in New York with publicly available data. Northern harriers are not expected to be especially vulnerable to turbine collisions, and impacts from Facility construction and operation are not expected to result in population declines for this species.

Peregrine Falcon

The state endangered peregrine falcon was not identified as potentially occurring within the Facility Site during agency correspondence; however, two observations were recorded during raptor migration surveys. Peregrine falcons occur mostly in open country, including open forests, and nest high on rocky outcrops and buildings (White et al., 2002). Based on a review of publicly available post-construction monitoring studies from wind energy facilities in New York did not indicate any records of peregrine falcon mortality, direct impacts to the species from Facility operation are expected to be minimal. Based on the limited number of observations of peregrine falcons during pre-construction surveys, indirect impacts to the species are not expected to result from Facility construction and operation.

State Species of Concern

Five state species of special concern were documented during surveys within the Facility Site (common loon, Cooper's hawk, northern goshawk, osprey, red-shouldered hawk, and sharp-shinned hawk). One observation of common loon was recorded during the first year of eagle use surveys. No common loon nesting habitat is present within the Facility Site and indirect impacts to this species are not expected based on the limited number of observations made during pre-construction surveys. Direct impacts due to turbine collisions during migration are expected to be minimal.

A limited number of red-shouldered hawk, sharp-shined hawk, and Cooper's hawk observations were recorded during pre-construction surveys in the Facility Site, and forest clearing for infrastructure construction represents the most immediate impact to these species. However, forest clearing will be conducted between November 1 and March 31 to the extent possible, which is outside the nesting period for these species. If tree clearing within the nesting period of these species is required, the Applicant will implement minimization measures to reduce indirect impacts to breeding raptors that could result from tree clearing.

Raptors have shown negligible displacement impacts and lower mortality rates than other avian groups at wind energy projects across the northeastern U.S. and eastern Canada, as discussed above in Section (f). All of the raptor species of special concern were observed passing through the Facility Site during migration and may be at risk of turbine collision; however, this risk of raptors colliding with turbines is considered to be low. Therefore, direct impacts to raptor species of concern from Facility operation are expected to be minimal and not result in local population declines for any of these species.

There were three state species of concern identified by NYNHP or USFWS as potentially occurring in the vicinity of the Facility Site that were not documented during on-site surveys: pied-billed grebe, least bittern, and short-eared owl. Further, no observational records were identified in any of the reviewed public sources. Impacts to these species are generally not anticipated, because they either do not use the Facility Site at all, or they use the Facility Site so infrequently as to not be detected during on-site surveys approved by NYSDEC and USFWS.

(iv) Impacts to Special Status Mammals

Special status bat species that may occur in the Facility Site based on their known range include the state- and federally-threatened northern long-eared bat (*Myotis septentrionalis*), and eastern small-footed myotis (*Myotis leibii*), which is listed as a state species of special concern. Both of these species hibernate during winter and can be found in forested areas throughout the northeast during spring, summer, and fall. Forested habitats within the Facility Site could provide roosting and foraging habitat for northern long-eared and eastern small-footed bat, although roosting habitat for the eastern small-footed bat (rocky outcrops and talus slopes) is limited. Neither species has been recorded in the vicinity of the Facility Site. Potential impacts to these bat species could include loss of foraging/roosting habitat associated with tree removal, direct mortality due to tree clearing, and turbine-related mortality during Facility operation.

Turbine-related mortality of northern long-eared bats has been documented at low levels at wind projects in the northeast, with 43 mortalities (less than 1% of bat mortality) documented at 19 facilities. The USFWS has concluded that, despite some monitoring limitations, northern long-eared bats were rarely detected as mortalities, even when they were known to be common on the landscape around wind energy facilities (USFWS, 2016). No northern long-eared bats have been recorded in Broome County. The closest known summer maternity roost site is approximately 81 km (50 mi) away from the Facility and the closest known hibernaculum is approximately 96 km (60 mi) away from the Facility. However, NYSDEC considers the range of the northern long-eared bat to include all of New York State during fall migration (NYSDEC, 2016b). Therefore, the Applicant has developed a

Net Conservation Benefit Plan (NCBP) to ensure there are no long-term impacts to state-wide or range-wide northern long-eared bat populations from the Facility (Appendix UU).

Eastern small-footed bat could potentially occur at the Facility Site. However, based on publicly available data, no eastern small-footed bat mortalities have been documented at any wind projects in New York, and only one fatality has been documented in Pennsylvania. Therefore, no significant impacts are expected to occur for this species.

(v) Impacts to Special Status Amphibians and Reptiles

No special status amphibian species were identified by NYNHP as occurring within the Facility Site. One state-listed threatened species, timber rattlesnake, is the only special status reptile species that may occur at the Facility site. In the Northeast, timber rattlesnakes inhabit deciduous and mixed-deciduous forests with rugged terrain, where rocky outcroppings, steep ledges, and rock slides occur (NYNHP, 2017b). Per NYNHP records, the species has historically been recorded in the southwest portion of the Facility Area.

Based on the New York State Amphibian and Reptile Atlas Project (NYS Herp Atlas) database, two special concern reptile species, wood turtle and eastern box turtle, could potentially occur in the Facility Site. Neither of these species were observed during on-site surveys. These species prefer slow-moving water with vegetated banks and soft bottoms and bask on fallen logs or rocks in the water. Many of the wetlands in the Facility Site are not ideal turtle habitat, either because they are too disturbed, too shaded, or lack areas with open water. However, some suitable habitat is present primarily in the wetlands with an open water component. If present, direct mortality through Facility construction will be limited for these species, because tree clearing will seldom occur along riparian areas. Please see Exhibit 23 Sections (b)(5) and (e)(2) for additional detail on avoidance and minimization measures for impacts to surface waters and aquatic organisms, respectively.

Two amphibian species of special concern, eastern longtail salamander and Jefferson salamander, may occur in the Facility Site based on data from the NYS Herp Atlas (NYSDEC, 2007a). The eastern longtail salamander is usually found along the borders of streams and wetlands. The Jefferson salamander is found in damp forested areas and breeds in fishless ponds and vernal pools. Impacts to these salamander species could occur in areas that might be disturbed during construction. However, impacts to populations of these salamander species have been minimized through changes to Facility design, including rerouting of access roads, that were made to avoid impacts to wetlands within which potential vernal pools were identified. Avoidance and minimization measures, including the use of horizontal directional drilling (HDD), will be implemented to minimize impacts to vernal pools within the Facility. Therefore, no vernal pool habitats will be disturbed by construction or operation of the Facility

and impacts to amphibian species that rely on these habitats are not anticipated to result from construction of the Facility. See section (m) below for further discussion of wetland impacts, and section (n) for additional detail on avoidance and minimization measures for impacts to wetlands.

(vi) Impacts to Special Status Invertebrates

No special status invertebrates were identified by NYNHP as occurring within the Facility Site. Two state-threatened species of mussels, green floater (*Lasmigona subviridis*) and brook floater (*Alasmidonta varicose*), have been documented in the Susquehanna River adjacent to the Facility Site. Two state-listed species of concern, yellow lampmussel (*Lampsilis cariosa*) and rapids clubtail (*Gomphus quadricolor*), have also been documented in the Susquehanna River. None of these species were identified within the Facility Site during on site surveys, and aquatic habitats in the Facility are largely unsuitable to host these species. Further, no suitable habitat for these species will be impacted by construction of the Facility. Therefore, no impacts to special status invertebrate species are anticipated as a result of Facility construction or operation. See Exhibit 23 for additional detail on avoidance and minimization measures for impacts to surface waters and aquatic organisms.

(vii) Impacts to Species of Greatest Conservation Need

Six avian species (bobolink, eastern meadowlark, American kestrel, ruffed grouse, wood thrush, and scarlet tanager) with SGCN-HP or SGCN status (but not state-listed) were observed during on-site surveys. Although Facility construction and operation could have an adverse impact on individuals of these species, suitable habitat is abundant within the Facility Site, and will be available during and after construction. Impacts to wood thrush and scarlet tanager are unlikely to occur during construction, as these are forest species and tree clearing will primarily be conducted when these species have migrated south. Impacts to ruffed grouse, a species that occupies forests year-round, are expected to be minimal due to the amount of forested habitat available on a regional scale. None of these six species are listed as threatened, endangered, or of special concern, and all have population numbers statewide that are more stable than species listed under one of these protection statuses. Therefore, it is not anticipated that Facility construction or operation will have a significant effect on regional, statewide or range-wide populations of these species.

Silver-haired bat, eastern red bat, and hoary bat are three species of mammals with SGCN status that are likely to occur within the vicinity of the Facility Site. Direct mortality due to Facility construction is expected to be unlikely. Tree clearing will take place between November 1 and March 31 to the extent possible, which is outside of the breeding and activity periods for these species. As outlined in the NCBP, the Applicant will implement measures to avoid and minimize impacts to the northern long-eared bat for tree clearing outside of

these dates, which will also minimize impacts to other bat species. Facility operation could potentially result in direct impacts to these species due to turbine collisions; however, Section (h) includes discussion of a curtailment plan to minimize impacts to the northern long-eared bat that will also reduce operational impacts to all bat species. These species are not listed as threatened, endangered, or of special concern, and have population numbers statewide that are more stable than species listed under one of these protection statuses. Therefore, it is not anticipated that Facility construction or operation will have a significant effect on statewide or range-wide populations.

Table 22-6. Summary of Temporary and Permanent Impacts for New York State Special Status Species that Have the Potential to Occur Within the Facility Site

Species	Temporary Impacts Anticipated Due to Construction			Permanent Impacts Anticipated Due to Operation and Maintenance			
	Indirect Impacts		Direct Impacts	Indirect Impacts			Direct Impacts
	Displacement	Habitat Disturbance	Injury or Mortality	Habitat Loss	Habitat Fragmentation	Displacement	Injury or Mortality[2]
State Endangered Species							
Peregrine Falcon[1] *Falco peregrinus*	none	none	none	none	none	none	unlikely
Golden Eagle *Aquila chrysaetos*	none	none	none	none	none	unlikely	unlikely
State Threatened Species							
Northern Long-Eared Bat *Myotis septentrionalis*	none	none	none	none	none	none	unlikely
Northern Harrier *Circus cyaneus*	none	none	none	none	none	unlikely	unlikely
Henslow's Sparrow[1] *Ammodramus henslowii*	none	none	none	none	none	none	unlikely
Bald Eagle *Haliaeetus leucocephalus*	unlikely	unlikely	none	none	none	unlikely	unlikely
State Species of Species Concern							
Common Loon[1] *Gavia immer*	none	none	none	none	none	none	unlikely
Red-headed Woodpecker[1] *Melanerpes erythrocephalus*	none	none	none	none	none	none	unlikely
Yellow-breasted Chat[1] *Icteria virens*	none	none	none	none	none	none	unlikely
Golden-winged Warbler[1] *Vermivora chrysoptera*	none	none	none	none	none	none	unlikely
Grasshopper Sparrow[1] *Ammodramus savannarum*	none	none	none	none	none	none	unlikely

Species	Temporary Impacts Anticipated Due to Construction			Permanent Impacts Anticipated Due to Operation and Maintenance			
	Indirect Impacts		Direct Impacts	Indirect Impacts			Direct Impacts
	Displacement	Habitat Disturbance	Injury or Mortality	Habitat Loss	Habitat Fragmentation	Displacement	Injury or Mortality[2]
	Indirect Impacts		Direct Impacts	Indirect Impacts			Direct Impacts
	Displacement	Habitat Disturbance	Injury or Mortality	Habitat Loss	Habitat Fragmentation	Displacement	Injury or Mortality
Wood Turtle *Glyptemys insculpta*	unlikely	unlikely	unlikely	none	none	none	none
Eastern Box Turtle *Terrapene carolina*	unlikely	unlikely	unlikely	none	none	none	none
Red-shouldered Hawk *Buteo lineatus*	none	none	none	unlikely	unlikely	unlikely	unlikely
Eastern Small-footed Myotis *Myotis leibii*	none	none	none	none	none	unlikely	unlikely
Eastern Longtail Salamander *Eurycea longicauda*	unlikely	unlikely	unlikely	none	none	none	none
Osprey[1] *Pandion haliaetus*	none	none	none	none	none	none	unlikely
Cooper's Hawk *Accipiter cooperii*	unlikely	unlikely	none	unlikely	unlikely	unlikely	unlikely
Northern Goshawk[1] *Accipiter gentilis*	none	none	none	none	none	none	unlikely
Sharp-shinned Hawk *Accipiter striatus*	unlikely	unlikely	none	unlikely	unlikely	unlikely	unlikely
Common Nighthawk[1] *Chordeiles minor*	none	none	none	none	none	none	unlikely
Cerulean Warbler[1] *Dendroica cerulean*	none	none	none	none	none	none	unlikely
Jefferson Salamander *Ambystoma jeffersonianum*	unlikely	unlikely	unlikely	none	none	none	none
High Priority Species of Greatest Conservation Need							

Species	Temporary Impacts Anticipated Due to Construction			Permanent Impacts Anticipated Due to Operation and Maintenance			
	Indirect Impacts		Direct Impacts	Indirect Impacts			Direct Impacts
	Displacement	Habitat Disturbance	Injury or Mortality	Habitat Loss	Habitat Fragmentation	Displacement	Injury or Mortality[2]
Bobolink *Dolichonyx oryzivorus*	potential	potential	none	unlikely	unlikely	potential	potential
Eastern Meadowlark *Sturnella magna*	potential	potential	none	unlikely	unlikely	potential	potential
	Indirect Impacts		Direct Impacts	Indirect Impacts			Direct Impacts
	Displacement	Habitat Disturbance	Injury or Mortality	Habitat Loss	Habitat Fragmentation	Displacement	Injury or Mortality
Species of Greatest Conservation Need							
American Kestrel *Falco sparverius*	unlikely	unlikely	none	unlikely	unlikely	unlikely	unlikely
Ruffed Grouse *Bonasa umbellus*	potential	potential	none	unlikely	unlikely	potential	unlikely
Wood Thrush *Hylocichla mustelina*	unlikely	unlikely	none	unlikely	unlikely	potential	potential
Scarlet Tanager *Piranga olivacea*	unlikely	unlikely	none	unlikely	unlikely	potential	potential
Silver-haired Bat *Lasionycteris noctivagans*	unlikely	unlikely	none	unlikely	unlikely	potential	potential
Eastern Red bat *Lasiurus borealis*	unlikely	unlikely	none	unlikely	unlikely	potential	potential
Hoary bat *Lasiurus cinereus*	unlikely	unlikely	none	unlikely	unlikely	potential	potential

[1]Based on the result of on-site surveys and publicly available data, the species either rarely occurs or does not occur at the site, however, based on the species' range and migration behavior, there is a low risk of the species colliding with turbines during migration.

[2] Species that could potentially be directly impacted by Facility operation are species that have been documented as fatalities at other New York wind facilities that are likely to occur at the Facility.

(g) Measures to Avoid or Mitigate Impacts to Vegetation, Wildlife and Wildlife Habitat

(1) Plant Communities

With respect to measures to avoid or mitigate impacts to plant communities (including vegetation), please see Section (c) above.

(2) Wildlife and Wildlife Habitat

With respect to wildlife and wildlife habitat, construction-related impacts to fish and wildlife should be limited to incidental injury and mortality due to construction activity and vehicular movement, construction-related silt and sedimentation impacts on aquatic organisms, habitat disturbance/loss associated with clearing and earth moving activities, and displacement due to increased noise and human activities. Minimization of impacts related to construction activity will be accomplished through careful site design (e.g., utilizing existing roads, avoiding sensitive habitat, and minimizing disturbance to the extent practicable), adherence to designated construction limits, and avoidance of off-limit sensitive areas. Please see the NCBP provided in Appendix UU for further information regarding additional measures that the Facility will take to avoid, minimize, and mitigate for impacts to birds and bats.

Minimization of impacts related to permanent habitat loss and forest fragmentation will be accomplished through careful site design. Facility access roads and collection lines have been sited along logging roads, the edges of agricultural fields, and pipeline rights-of-way to minimize impacts to, and fragmentation of, wildlife habitat. Cleared forest land along Facility access roads and at the periphery of turbine sites will be allowed to regenerate in areas that are not required for Facility maintenance, which will provide habitat for early successional species over the short term and will eventually support forest species in the long term.

The Facility has been designed to minimize bird and bat collision mortality (see NCBP in Appendix UU). In an effort to reduce avian and bat impacts, electrical collection lines between the turbines will generally be buried to the maximum extent practicable. Lighting of the turbines (and other infrastructure) will be minimized to the extent allowed by the Federal Aviation Administration (FAA), and will follow specific design guidelines to reduce collision risk (e.g., using motion-detection and blinking lights with the longest permissible off cycle). The use of guy wires will be minimized and all guy wires will be marked to reduce collisions. In addition to Facility design features, an adaptive management plan to reduce northern long-eared bat fatalities is included in the NCBP, which will reduce risk to all bat species including migratory bats.

(3) Special Status Species

Construction and operation of the Facility may result in some level of impact to three state-listed species; northern long-eared bat, bald eagle, and golden eagle. An estimate of take for each species was calculated as part of a NCBP for the Facility, based on a 33-turbine layout and the incorporation of avoidance and minimization measures to reduce impacts to listed species. Although take of these species has been conservatively calculated and included in the NCBP for the Facility actual take of these species is unlikely.

Post-construction data collected from more than 33 post-construction studies from within 100 miles of the Facility was used to develop a take estimate for northern long-eared bat. Data was filtered to exclude studies that occurred prior to the onset of WNS in each of the studied populations. Collision risk at the Facility for northern long-eared bat would be limited to the fall migration period as defined by the NYSDEC (July 1 – September 30) because no summer maternity records exist for northern long-eared bat in Broome County, New York and there are no known spring northern long-eared bat fatalities. The estimated take for the Facility is 16 northern long-eared bats for the life of the Facility, based on available data and the implementation of a curtailment plan during the fall migration period as outlined in Section (h)(3). Although this is a conservative estimate, and the last known northern long-eared bat fatality at a wind facility in New York occurred in 2011, compensatory mitigation will be implemented to offset potential take of northern long-eared bats in order to ensure a net conservation benefit for the species.

An estimate of take for bald and golden eagles was determined based on the level of eagle use observed at the Facility, the availability of nesting and foraging habitat available within the Facility Site, and a review of publicly available resources on eagle fatalities at wind facilities, including 28 post-construction monitoring reports. Eagle use data collected during eagle use surveys for the Facility was entered into the USFWS Bayesian Risk Model, which incorporates data collected during pre-construction eagle use surveys with a collision probability based on post-construction data collected at operational wind facilities (USFWS, 2013). A local area population (LAP) was also determined for the Facility, which is based on a 138-kilometer (86-mile) buffer of the Facility, in order to assess potential direct impacts at a population level.

The LAP for bald eagles was determined to be 737 eagles, which is based on the results of surveys conducted by USFWS in 2009, and is likely conservative since State and regional surveys suggest that the bald eagle population has continued to increase since then (NYSDEC, 2016c). [redacted]

[redacted] Despite increasing bald eagle populations in New York State, there have been no bald eagle fatalities recorded from wind facilities in the State. Further, the USFWS states that due to the ecology and behavior of bald eagles, higher use of an area by bald eagles is not indicative of higher risk (USFWS 2016a). Based on this statement, the seasonality of bald eagle use documented during on-site surveys, the limited amount of nesting and foraging habitat available within the Facility, and the absence of bald eagle fatalities due to wind turbines in New York State, the conservative estimated take of bald eagles due to Facility operation is [redacted]

The eastern golden eagle population is estimated to be approximately 5,122 individuals (±2,000 individuals). based upon 2009 data from occupied nesting territories in eastern Canada (USFWS 2016c). Data suggest that the population has remained steady since the late 1990's (NYNHP 2017d). [redacted]. Golden eagle use at the Facility is limited to spring and fall migration, and golden eagles have not nested in New York since the 1970's (NYNHP 2017d). Telemetry data provided by DOAS indicates that golden eagles primarily migrate around the Facility Site, and when golden eagles do migrate over the Facility they typically fly at heights above the rotor-swept height for turbines considered for Facility Site. [redacted]

Predicted take of bald and golden eagles will be offset through compensatory mitigation as outlined in the NCBP. The avoidance, minimization, and mitigation measures outlined in the NCBP will offset the potential impacts of the Facility to bald and golden eagles and result in a net conservation benefit to both species.

(h) Avian and Bat Impact Analysis and Monitoring Program:

(1) Comparative Analysis of Avian and Bat Use at the Facility

Numerous avian pre-construction surveys were conducted to support the Article 10 Application. In combination with data provided by local experts and obtained from publicly-available sources, the results of these surveys have been used to assess potential impacts the Facility could have on birds. Per consultations with NYSDEC, impacts to bats from Facility construction and operation are expected to be similar to impacts observed at similar wind facilities in New York; therefore, the analysis of cumulative impacts to bats is based on pre- and post-construction studies conducted at other wind facilities in the region.

(i) Pre-construction Surveys

Avian pre-construction surveys were conducted by WEST between 2016 and 2018. As mentioned above in Section (d), multiple reports providing the results of avian surveys were submitted to the USFWS and NYSDEC and are included with this Application in Appendix OO. The methods and results of these surveys, as provided in these reports, are summarized in this section.

Breeding Bird Surveys

WEST conducted breeding bird surveys between May and July in 2017 to establish baseline data for avian species occurring and breeding within the various habitats in the Facility Area, to investigate breeding bird use and the potential presence of sensitive or state-listed birds, and provide a baseline of bird use data to be used for a future before-after-control-impact (BACI) analysis. Breeding bird survey protocols were developed in accordance with the NYSDEC Guidelines for Conducting Bird and Bat Studies at Commercial Wind Energy Projects (NYSDEC, 2016a) and were approved by the NYSDEC in May 2017.

WEST conducted surveys along eighteen 300-meter-long transects that were systematically placed within major habitat types in the preliminary Facility Area at areas where turbines are proposed and at control areas away from turbines. Each transect consisted of six, 50-meter-radius survey plots placed 50 meters apart, and each plot was surveyed between a half-hour before sunrise and four hours after sunrise for five minutes. Surveys were conducted weekly between May 16 and July 15, 2017. All avian species seen or heard within the survey plot were recorded. Twelve of the transects were centered on proposed turbine locates and six were in control areas outside turbine areas where no impact was expected to occur. Of the 108 survey plots, 91 were located in forested habitat, and 17 were located in non-forested habitat.

WEST recorded 7,460 bird observations within 7,082 separate groups. A total of 96 species were detected, excluding unidentified birds that could be identified to genus only. The most common species observed included five species accounting for 38.1% of all observations: red-eyed vireo (1,087 observations), ovenbird (785), blue jay (356; *Cyanocitta cristata*) chestnut-sided warbler (315; *Setophaga pensylvanica*) and veery (296; *Catharus fuscescens*). Species diversity ranged from 13.1 species/transect/survey at transect T7 to 4.44 species/transect/survey at transect T6. For both control and turbine transects, use varied across the Facility Area, with no consistent differences in use between transects dominated by either non-forested or forested vegetation types.

No federally threatened or endangered birds were observed during breeding bird surveys. One bald eagle, which is listed as threatened in New York State, was observed incidentally from survey plot 4 on transect C5. Three NYSDEC species of special concern were observed during surveys; Cooper's hawk, sharp-shinned hawk, and red-shouldered hawk. Additionally, three species of greatest conservation need (SGCN) were observed, including brown thrasher (*Toxostoma rufum)*, Canada warbler and bobolink. Additional detail regarding the spring breeding bird surveys is provided in the Pre-Construction Bird Surveys for the Bluestone Wind Project report included in Appendix OO.

Eagle Use Surveys

Surveys to document eagle use of the Facility Site were conducted by WEST for two years between March 2016 and March 2018 consistent with NYSDEC Guidelines for Conducting Bird and Bat Studies at Commercial Wind Energy Projects (NYSDEC, 2016a) and the USFWS Eagle Conservation Plan Guidance (ECPG) (USFWS, 2013). Between March 2016 and March 2017, WEST surveyed 12 survey plots within the preliminary Facility Area monthly. In March 2017, the survey protocol was revised through consultations with the USFWS based on revisions to the Facility Area and to the ECPG issued in December 2016 (USFWS, 2016b). A second full year of surveys was conducted from March 15, 2017 through March 15, 2018, and included an expansion of coverage to 24 survey plots, an increased survey frequency during the fall and spring migration periods, and a focus on eagles and raptor species of concern such that no other species were recorded. Under this revised plan, 6 survey plots were surveyed weekly throughout the month so that all 24 survey plots were surveyed monthly per the ECPG., and all 24 survey plots were surveyed weekly during the fall (October 25 – December 2) and spring (February 21 – March 28) migration periods. Additional detail regarding eagle use survey protocols is provided in the Eagle Observation Survey Protocol for the Bluestone Wind Project reports submitted to the USFWS and NYSDEC in March 2016 and September 2017 and included in Appendix SS.

Between March 2016 and March 2018, a total of 718 hours of eagle observation surveys were conducted. Each survey was conducted from a central point within an 800 meter-radius survey plot for one hour. Surveys were conducted in all weather conditions except when visibility was reduced to <800 meters, and were stratified across a range of daylight hours between 0800 and 1700 hours. A total of 12 species of raptors were recorded within the survey plots.

During the first year of eagle use surveys, all large birds were recorded, including all species of raptors, waterfowl, and corvids. A total of 876 birds were recorded during 155 hours of surveys. Of these, American crow, Canada goose, and turkey vulture comprised 76.6% of all observations. Ten species of raptors were recorded, with red-tailed hawk and broad-winged hawk being the most common species observed. There were a total of 9 bald eagle observations during year one, and all observations occurred during the spring and winter. Bald eagle use was 0.11 birds/800-m plot/survey hour in the winter and 0.08 birds/800-m plot/survey hour in the spring. Seven other species of concern were also recorded, including northern harrier (3 observations), Cooper's hawk (5 observations), red-shouldered hawk (2 observations), and one observation each of sharp-shinned hawk, northern goshawk, osprey, and common loon.

During year two of eagle use surveys, a total of 563 hours of surveys were conducted. Year two surveys were focused on eagle use of the Facility Site, therefore, bald and golden eagle were the most commonly recorded species. A total of 103 bald eagle observations and 27 golden eagle observations were recorded. Bald eagles were observed in 10 of 12 months and highest use was recorded in the spring. Golden eagles were only recorded during February, March, October and November. A total of 241 eagle minutes (i.e., minutes an eagle was observed flying within 800 m of the survey plot center and below 200 m above ground level) were recorded during 563 hours of surveys within the 24 survey plots. Eagle use was highest during the spring (0.42 birds/800-m plot/survey hour), followed by fall (0.17) and winter (0.15). Summer eagle use was lowest at 0.01 birds/800-m plot/survey hour. Overall eagle use was highest at points 15 (0.91 birds/survey hour), 14 (0.52 birds/survey hour) and 13 (0.78 birds/survey hour), all of which are located in the northeast portion of the Facility Area. Overall eagle use was lowest (no eagles observed) at point 8, which is on the western edge of the Facility Area, and point 24, which is adjacent to points 14 and 15.

Seven additional species of concern were recorded during year two surveys, including northern harrier (7 observations), peregrine falcon (2 observations), red-shouldered hawk (8 observations), sharp-shinned hawk (7 observations), northern goshawk (2 observations), Cooper's hawk (2 observations) and osprey (1 observation).

Further details regarding the results of eagle surveys can be found in the Eagle Use Studies for the Bluestone Wind Project report, provided in Appendix OO.

Raptor Migration Surveys

In order to assess the spatial and temporal use of the Facility Area by migrating raptors, WEST conducted raptor migration surveys within the peak periods of migration in the fall of 2016 and spring of 2017. Surveys were conducted in the Facility Area at two locations in the fall (August 15 – December 27) and three locations in the spring (March 13 – May 30) using methods outlined by the Hawk Migration Association of North America (HMANA). Survey plots were selected to provide a 360° view for maximal visibility of the Facility Area. Surveys were conducted at each location once per week between 0800 hours and two hours prior to sunset.

A total of 266 hours of surveys were conducted, and a total of 299 individual raptors of thirteen species were recorded. Broad-winged hawk (*Buteo platypterus*) and red-tailed hawk were the species with the highest number of observations, both of which are common species. Two state-endangered species, golden eagle and peregrine falcon, and two state-threatened species, bald eagle and northern harrier, were recorded. Total observations for these species were; 7 golden eagles, 29 bald eagles, 12 northern harriers and 3 peregrine falcons. Four State species of special concern were also recorded; Cooper's hawk, sharp-shinned hawk, red-shouldered hawk, and osprey. Flight height varies by species, but on average, 53.9% of migrating raptors observed were recorded within the rotor-swept height of turbines. Overall raptor use was higher in the spring at 1.33 birds/survey hour than in the fall (0.39 birds/survey hour). Results of the 2016–2017 raptor migration surveys are presented in the Raptor Migration Surveys for the Bluestone Wind Project report, included in Appendix OO.

Eagle Nest Surveys

As part of an assessment of the potential risk the Facility could pose to eagles, WEST conducted aerial surveys in spring 2017 to search for eagle nests within 10 miles of the Facility Site. Non-eagle raptor nests within the Facility Site were also documented. The survey focused on species that build large nest structures, such as bald eagle and red-tailed hawk. A total of 10 bald eagle nests were documented, 7 of which were active (an incubating adult or chicks were observed). None of these nests are located within the Facility Site. The closest bald eagle nests to the Facility Site are located 3.2 miles northwest and 3.7 miles southeast of the nearest proposed turbine locations. An additional 23 raptor nests for which species could not be determined due to the nests not being in use were also identified, most of which were likely built by red-tailed hawks based on their size and the relative abundance of the species within the Facility Site. Results of aerial

nest surveys are presented in a technical memorandum provided by WEST on June 13, 2017, included in Appendix OO.

(ii) Cumulative Avian Impacts

Based on the results of the pre-construction avian surveys detailed above, direct impacts to avian species resulting from turbine collisions at the Facility are expected to be similar to the number of collisions reported at other wind energy projects in New York State. A review of 17 post-construction monitoring studies conducted at 10 facilities in New York found that bird mortality averaged 1.68 birds/MW/year (2.65 birds/turbine/year) and ranged from 0.83 to 2.66 birds/MW/year (1.25 to 3.99 birds/turbine/year). Based on this average approximately 237 bird fatalities per year could be expected at the Facility. However, the curtailment regime planned for the Facility from July 1 to September 30 to reduce the estimated take of northern long-eared bat may reduce the estimated avian impacts, further reducing the total percentage of direct impacts from the Facility.

Currently there is an estimated 1.75 gigawatts (GW) of installed wind capacity in New York State. From 2020 to 2050, the projected 30-year life of the Facility, on-shore wind development in New York is estimated to increase to 5.61 GW (USDOE, 2018). Based upon the average direct avian impacts per MW from New York wind energy projects (1.68 birds/MW/year), and projections of future wind capacity to be installed in New York by 2050, an estimated 9,500 birds per year will be directly impacted by wind in New York by 2050, and the Facility, with 237 bird fatalities per year, will account for approximately 2.5% of direct bird impacts by wind facilities in New York.

Nationally, wind turbines are estimated to be responsible for a nominal proportion of all avian fatalities resulting from anthropogenic causes; thus, wind energy is considered a minor contributor to bird mortality compared to other anthropogenic activities. A recent analysis of fatality data from 116 studies at wind facilities across the US and Canada found that an estimated that 368,000 bird fatalities may occur per year nationally (Erickson et al, 2014). These impacts are spread across many species and the effect on any given population is very small and likely negligible with respect to influencing population viability or stability.

As discussed in Section (d), there is a low risk of turbine collisions for bald and golden eagles and collisions are unlikely. [redacted] To date, there have been no reported bald eagle fatalities at wind energy facilities in New York State. Therefore, cumulative impacts from the Facility and other wind projects in New York are not anticipated for bald eagles and will not result in a significant impact to bald eagle populations.

The golden eagle population in the eastern U.S. is estimated to be approximately 5,122 individuals and has remained relatively steady since the 1970's. [redacted] which will be offset by compensatory mitigation (See NCBP in Appendix UU). There have been no documented golden eagle fatalities in New York, therefore no cumulative impacts to golden eagles with other wind facilities in the State are anticipated.

(iii) Cumulative Bat Impacts

Across the US and Canada, it's estimated that 500,000 bats are killed annually by wind turbines with a range of less than 1 bat/MW/year to 70 bats/MW/year. A total of 24 unique species have been identified as fatalities, however, three migratory bat species (hoary bat, eastern red bat, and silver-haired bat) comprise 50-75% of all bat carcasses found at wind energy projects (USGS, 2012).

A recent analysis of fatality monitoring data at 24 wind energy facilities in the northeastern U.S. found that bat fatality rates range from 0.12 to 21.4 bats/MW/year. On a state level, a review of fatality data from 17 facilities in New York averaged 6.05 bats/MW/year. Assuming that impacts to bat species at the Facility would be similar to those reported at other wind energy projects in New York, approximately 868 bat fatalities per year could be expected at the Facility. However, as discussed in Section (h)(3), the Facility is committed to curtailing turbines below wind speeds of 11 mph (5 m/s) from July 1 to September 30 when temperatures are above 50 degrees Fahrenheit in order to reduce northern long-eared bat collisions, which is expected to result in an estimated 80% reduction of northern long-eared bat fatalities. Additionally, this curtailment regime is expected to result in at least a 60% reduction in fatalities for all bat species, which reduces the estimated number of bats directly impacted by the Facility from 868 bats per year to approximately 347 bats per year.

Wind energy projects in New York have recorded similar species composition as wind energy projects in other parts of the US, with the three migratory tree bats comprising more than half of all recorded carcasses. Assuming that 75% of those bats directly impacted by the Facility are migratory tree bats, this would result in the direct impact to approximately 650 individuals of hoary bat, eastern red bat, and silver-haired bat combined. However, proposed curtailment could result in significant reductions of migratory tree bat fatalities during the fall migration, reducing estimated migratory tree bat fatalities from approximately 650 to 260 bats per year.

Based upon the average direct per-MW bat impacts from New York wind energy projects (6.05 bats/MW/year) and projections of future wind capacity to be installed in New York by 2050, an estimated 34,300 bats per year will be directly impacted by wind in New York in 2050. However, if a similar curtailment regime being employed

at the Facility is utilized by most or all wind projects in New York by 2050, the estimated number of bats directly impacted by wind projects could drop from 34,300 bats per year to 13,720 bats per year. If species composition of bats found at wind energy projects remains consistent, estimated direct impacts to migratory tree bats in 2050 could drop from 25,725 bats per year to 10,290 bats per year. Based upon the estimated annual take of bats at the Facility (347 bats per year) and assuming that in 2050 all other wind projects have similar bat direct impacts, the Facility may account for approximately 3.3% of all bat direct impacts from wind projects in New York.

An estimated 25% of bat fatalities are comprised of cave-dwelling species of bats, including big brown bat, eastern pipistrelle, and a number of *Myotis* species, including northern long-eared bat. Although collisions with turbines results in direct impacts to these species, these impacts are considered minimal in contrast to the declines these species have endured due to white-nose syndrome (WNS), a disease caused by an infectious fungus that was first discovered in New York State in 2006. WNS has caused a 98% decline in northern long-eared bat populations in New York State since the fungus was first discovered, and is the primary reason the USFWS recently listed the species as threatened under the ESA (USFWS, 2015). It is estimated that between 5.7 and 6.7 million bats have died as a result of WNS, which has been identified in 31 states (USFWS, 2012). The NYSDEC has identified WNS as the primary threat to bat species in New York (Carl Herzog, NYSDEC, pers. comm.).

(iv) Habitat Fragmentation

A Habitat Fragmentation Analysis was conducted for the Facility at a local and regional scale. Calculations in the Habitat Fragmentation Analysis provide a more conservative estimate of impacts than those provided in (f), as calculations were based on impact assumptions that anticipated a total of 73 acres of permanent habitat loss due to clearing for facility infrastructure, which is higher than the 53.6 acres of habitat loss that is anticipated based on design drawings. Indirect impacts to habitat may result from the functional loss or degradation of habitat due to construction and operations; these fragmentation effects are anticipated to extend up to 300 feet beyond the limits of disturbance. Therefore, habitat fragmentation effects were calculated based on a conservatively estimated total of 2,012 acres of wildlife habitat that could be indirectly impacted by the Facility. At the local scale (within a 2.5-mile buffer of the Facility), this results in an approximately 4.1% decrease in wildlife habitat. On a landscape scale, habitat fragmentation is anticipated to result in a 0.5% loss of forested and grassland habitats within Broome County. Fragmentation of forested habitat is conservatively estimated to result in a 4.2% decrease in patch size and a 7.0% increase in forest edge within the Facility Area.

Further information regarding habitat fragmentation is included in the Habitat Fragmentation Analysis for the Bluestone Wind Project, provided in Appendix TT.

(2) Avian and Bat Post-Construction Monitoring

The Applicant has developed a Post-Construction Monitoring Program (Monitoring Program) to assess the direct and indirect impacts of the Facility on bird and bat species. The Monitoring Program was developed in consultation with the NYSDEC and USFWS in accordance with NYSDEC's June 2016 *Guidelines for Conducting Bird and Bat Studies at Commercial Wind Energy Projects*, and Tier 4 of the *Wind Energy Guidelines* for standard post-construction studies. Monitoring will be conducted for 2 years post-construction following commencement of operation and will be conducted year-round. During the spring, summer and fall (March 15 – October 31), surveys will be completed weekly for all birds and bats. During the winter (November 1 – March 14), carcass searching will be conducted bi-weekly and will focus on eagles. The Monitoring Program will include: standard carcass searches of selected turbines; searcher efficiency trials to determine percentage of carcasses found by searchers; and carcass removal trials to estimate the length of time that a carcass remained in the field for possible detection. Adjusted fatality estimates for birds and bats based on the results of searcher efficiency trials and carcass removal trials will be used to estimate bird and bat mortality within the Facility Site. Further details regarding the Monitoring Program is provided in the NCBP, in Appendix UU.

(3) Avian and Bat Impact Avoidance and Mitigation Plan

Based on the data collected during pre-construction surveys, the Applicant has extensively evaluated the potential impacts of Facility construction and operation to avian and bat species through the development of an Avian Risk Assessment and Cumulative Impacts Analysis, provided in Appendix QQ and Appendix VV, respectively. Based on these analyses, the Applicant has committed to a number of measures to avoid, minimize, and mitigate impacts to avian and bat species, which are outlined in the NCBP that was developed for three New York State species of concern that could be impacted by the Facility; bald eagle, golden eagle, and northern long-eared bat (see the NCBP for the Bluestone Wind Project, provided in Appendix UU). The NCBP includes [redacted] take of bald eagle, golden eagle, and northern long-eared bat, although unlikely, will be offset through compensatory mitigation measures outlined in the NCBP in order to achieve a net conservation benefit for these species.

(i) Map Showing Delineated Wetland Boundaries

(i) Wetland Boundaries and Mapping

Wetland delineations at the Facility Site were conducted through on-site field investigations out to 500 feet from the area to be disturbed by the construction of the Facility. Delineations were conducted per the three-parameter methodology described in the U.S. Army Corps of Engineers (Corps) Wetland Delineation Manual, and the appropriate Regional Supplement to the Corps of Engineers Wetland Delineation Manual. Additionally, freshwater wetlands regulated under Article 24 of the New York Environmental Conservation Law (ECL) were determined according to methods described in the NYSDEC Freshwater Wetlands Delineation Manual (1995).

All wetland boundaries were defined in the field by sequentially numbered pink surveyor's flagging marked and locations were recorded using GPS technology with reported sub-meter accuracy. Wetlands were mapped accordingly and are shown on Figure 22-2 and within the Wetland Delineation Report (Appendix RR).

As documented in Appendix RR, EDR delineated 64 wetlands within a 200-foot corridor centered on Facility components, totaling approximately 29 acres. In addition, EDR delineated 28 streams within a 200-foot corridor centered on Facility components, totaling approximately 9,133 linear feet (1.72 miles). See Table 3 of the Wetland Delineation Report for additional information. Locations of field delineated wetlands resources beyond the 200-foot wide corridor are included in Figure 22-2. As described below and in the Appendix RR, wetlands and streams were categorized as one or more of the following community types: emergent wetland (PEM), scrub-shrub wetland (PSS), forested wetland (PFO), water (POW), riverine upper perennial (R3), riverine intermittent (R4) and riverine ephemeral (R6). Many wetlands identified contained more than one community type, and in many cases a delineated area included both wetlands and streams.

Please note that in most cases delineated wetlands and streams extend beyond the boundaries of the delineated study area, and are thus larger than the acreage documented. Although no NYSDEC-mapped wetlands were identified within the Facility Site per a review the NYSDEC online resource mapper, one wetland (Wetland M) appears to be greater than 12.4 acres in size and therefore may fall under jurisdiction of the NYSDEC.

(ii) Jurisdictional Determination

The Applicant has provided a draft copy of the Wetland Delineation Report and delineated wetland boundaries to the NYSDEC regional biologist and the U.S. Army Corps of Engineers in order to schedule a Jurisdiction

Determination (JD) site visit. The Applicant anticipates the JD visit will occur in late summer and any follow-up information resulting from this visit will be provided to the Siting Board.

(iii) NYSDEC-Regulated Wetlands and Streams

Review of NYSDEC Freshwater Wetlands mapping indicates that there are no state-regulated wetlands that intersect the Facility Site. Wetland GS-1 is the nearest wetland to the Facility, which is approximately 2,000 feet north of Turbine 36. As stated previously, one wetland (Wetland M) appears to be greater than 12.4 acres in size and therefore may fall under jurisdiction of the NYSDEC. Work at Wetland M includes the installation of collections lines which will be installed with trenchless technologies, thus avoiding impacts to state-regulated wetlands.

NYSDEC stream mapping indicates that there are seven state protected streams that flow through the Delineation Study Area. Protected streams include one Class A, one Class B(T) and five Class C(T). There are also three NYSDEC-mapped unprotected (Class C) streams within the Delineation Study Area. See Exhibit 23 for additional information.

(iv) Mapping and Preliminary Design Drawings

All wetlands and streams are presented within the maps located in Appendix B of the Wetland Delineation Report. Additionally, these wetland and stream resources are shown on the Preliminary Design Drawings included with Exhibit 11.

(j) Description of Wetlands

During on-site delineations of wetlands and streams, data were collected from one or more sample plots in each delineated wetland (depending on the size and diversity of ecological communities of the delineated area), and recorded on USACE Routine Wetland Determination forms, which are included in the Wetland Delineation Report for the Bluestone Wind Project (Appendix RR). Data collected for each of the wetlands included dominant vegetation, hydrology indicators, and soil characteristics. Data collected for streams included information on channel width (mean high water mark), water depth, substrate material, bank condition and gradient. Additional detail on wetland delineation and data collection methods is described in the Wetland Delineation Report. Also included in the Wetland Delineation Report is a table of all of the wetlands delineated within the Delineation Study Area, which indicates wetland acreage within the Delineation Study Area, wetland community type, and whether

they are expected to fall under State or federal jurisdiction (or both). Descriptions of vegetation, soils, and hydrology within each wetland community type identified within the Delineation Study Area are presented below.

Forested wetland (PFO) – These communities are dominated by trees that are 20 feet or taller, but also include an understory of shrubs and herbaceous species. Forest wetlands in the Study Area are dominated by red maple and eastern hemlock in the overstory. Understory vegetation includes saplings of the above-mentioned species and occasionally shrub species such as spice bush (*Lindera benzoin*), and Morrow's honeysuckle (*Lonicera morrowii*). Herbaceous species in the forested wetlands include sedges (*Carex* spp.), cinnamon fern, sensitive fern, and spotted jewelweed (*Impatiens capensis*). Evidence of wetland hydrology observed in these wetlands at the time of delineation included soil saturation, oxidized rhizospheres on living roots, geomorphic position, drainage patterns, and sparsely vegetated concave surfaces.

Scrub-shrub wetlands (PSS) – Scrub-shrub wetlands are characterized by dense stands of shrub species and small trees less than 20 feet tall. Plant species typically encountered in the scrub-shrub wetlands delineated within the Study Area include silky dogwood, and meadowsweet (*Spiraea alba*). Herbaceous vegetation in these areas includes reed canary grass *(Phalaris arundinacea)*, sensitive fern, common boneset (*Eupatorium perfoliatum*), and sedges including as soft rush *(Juncus effuses),* and broom sedge (*Carex scoparia).* Evidence of wetland hydrology observed in scrub-shrub wetlands at the time of delineation consisted of indicators such as drainage patterns, surface water, saturation, and sparsely vegetated concave surfaces. Hydric soil indicators included depleted soils with low chroma (2 or less) and prominent redox concentrations.

Emergent wetlands (PEM) – These wetland areas are dominated by herbaceous vegetation including common rush (*Juncus effusus*), spotted jewelweed, and numerous sedge species. Evidence of wetland soils included low chroma matrix with dark brown to black colors (10YR 2/1) and high chroma mottles (7.5YR 4/6) throughout the matrices with prominent redox concentrations. Wetland hydrology indicators found within these areas at the time of delineation included hydrology visible on aerial imagery, standing surface water, high water table, soil saturation, drainage patterns, oxidized rhizospheres on living roots, inundation, and the presence of reduced iron. (see Photos 9 to 12 in Appendix C of the Wetland Delineation Report).

Open Water (OW) – Two open water areas were delineated. These ponds occurred in open fields, scrub-shrub, and forested environments, and typically have well-defined banks and a fringe of emergent wetland vegetation. Although not verified, water depths of such ponds are typically in excess of four feet deep (see Photos 13 to 16 in Appendix C of the Wetland Delineation Report).

Streams – Identified streams are mostly located within forests and hedgerows, and generally have a gentle to moderate gradient (0-5%). The majority of the delineated streams appeared to be intermittent channels. Most of the streams are less than 10 feet wide with variable substrates and vegetative cover characteristics. The delineated stream channels are generally characterized by rock and cobble substrate and well-defined, abrupt steep banks, and flow during the wet season (winter to spring).

(k) Wetland Functional Assessment

A functions and values assessment was conducted following the general methodology described in the *Wetlands Functions and Values: Descriptive Approach* described in the September 1999 supplement to *The Highway Methodology Workbook* (Supplement) by the New England Division of the USACE (USACE, 1995)

Wetland functions are ecosystem properties that result from the biologic, geologic, hydrologic, chemical and/or physical processes that take place within a wetland. These functions include:

1. Groundwater Recharge/Discharge
2. Floodflow Alteration
3. Fish and Shellfish Habitat
4. Sediment/Pollutant Retention
5. Nutrient Removal/Retention/Transformation
6. Production (Nutrient) Export
7. Sediment/Shoreline Stabilization
8. Wildlife Habitat

Wetland values are the perceived benefits for society that can be derived from the ecosystem functions and/or other characteristics of a wetland. Values attributed to wetlands in the Supplement include the following:

1. Recreation
2. Education/Scientific Value
3. Uniqueness/Heritage
4. Visual Quality/Aesthetics
5. Threatened or Endangered Species Habitat

Based on the "Considerations/Qualifiers" outlined in the Supplement, EDR developed a spreadsheet that includes several basic considerations that help identify the primary functions and values provided by wetlands.

These considerations include observed vegetation conditions, hydrologic conditions, size, adjacent area conditions, and the availability of public access. Specific conditions within each of these consideration areas were also defined to allow each wetland's functions and values to be evaluated based on data collected during field delineation. Wetlands delineated within the Facility Site were entered into the spreadsheet and wetland characteristics were identified for each. Data regarding these wetland characteristics and associated functions and values were collected during the wetland delineations surveys conducted in May 2018. The spreadsheet containing results of the qualitative assessment is included in Appendix D of the Wetland Delineation Report (Appendix RR of this Application).

The functions and values assessment indicates that most of the delineated wetlands within the Study Area provide some level of wildlife habitat, groundwater recharge and water quality improvement functions. In most cases these functions are limited by the small size of many of the wetlands. See Appendix RR for additional details.

(l) Off-site Wetlands Analysis

EDR analysis suggests that the majority of the delineated wetlands and all delineated streams are likely to be hydrologically connected to Waters of the US (WOUS) and considered to be jurisdictional by the U.S. Army Corps of Engineers under Section 404 of the Clean Water Act. Nine of the delineated wetlands (Wetlands, F, K, UU, VV, XX, ZZ, AAA, BBB, and KKK) appear to be isolated and likely will not be considered jurisdictional due to a lack of hydrological connectivity.

(m) Wetland Impacts

During construction, temporary and permanent direct or indirect impacts to wetlands and surface waters may occur as a result of the installation of access roads, the upgrade of local public roads, the installation of above-ground or buried electrical collection lines, and the development and use of temporary workspaces around the turbine sites. Direct impacts, including clearing of vegetation, earthwork (excavating and grading activities), and the direct placement of fill in wetlands and surface waters, are typically associated with the development of access roads and workspaces around turbines. The construction of access roads is anticipated to result in permanent filling (loss of wetland/surface water acreage), permanent forest conversion (forested wetlands only), and temporary impacts to wetlands. The development and use of temporary workspaces will result in only temporary impacts to wetlands/streams. The installation of above-ground or buried collection lines will temporarily disturb streams and wetlands during construction as a result of clearing (brushhogging, or similar clearing method requiring no removal of rooted woody plants). In addition, soil

disturbance and permanent forest conversion from burial of the electrical collection lines may occur. Indirect impacts to wetlands and surface waters may result from sedimentation and erosion caused by adjacent construction activities (e.g., removal of vegetation and soil disturbance). This indirect impact may occur at wetlands adjacent to work areas where no direct wetland impacts are anticipated, including areas adjacent to proposed access road upgrade/construction, electrical collection and transmission routes, turbine sites, staging area(s), wind measurement towers, or the substations.

Based on the limits of disturbance as determined through preparation of the preliminary design drawings, construction of the Facility is anticipated to result in an impact to a total of 2.98 acres of wetland. Of this impact, 1.90 acres will be temporary impact, 0.41 acres will be permanent impact, and 0.67 acres will be permanent forested wetland conversion. All impacts are depicted on the Wetland and Stream Impact Drawings (Appendix WW). Temporary and permanent impacts to each wetland are presented below in Table 22-7. Table 22-7 also identifies the type of impact, measures that will be taken to reduce impact, and reasons the impact could not reasonably be avoided, for each wetland that will be impacted.

Table 22-7. Wetland Impacts

Wetland Delineation ID	Wetland Type (1)	Temporary Wetland Impact (acres)	Permanent Wetland Impact (acres)	Permanent Wetland Forest Conversion (acres)	Facilities Crossing Resource (3)
Wetland A	PSS	0.01	0.02	--	AR, OM
Wetland L	PFO	--	0.19	0.34	AR
Wetland J	PFO	--	0.03	0.001	AR
Wetland V	PFO	--	--	0.03	LA
Wetland Y	PSS	0.03	0.02	--	AR, BI
Wetland Z	PEM	0.41	--	--	BI
Wetland EE	PFO	--	0.06	0.07	AR, BI
Wetland EE	PEM	0.00	--	--	AR, BI
Wetland GG	PEM	0	0.04	--	AR, BI
Wetland HH	PEM	0.02	0.00	--	BI
Wetland HH	PFO	--	0.01	0.02	AR, BI
Wetland KK	PFO	--	--	0.01	BI
Wetland LL	PFO	--	--	0.03	BI
Wetland MM	PFO	--	--	0.08	BI
Wetland SS	PFO	--	--	0.02	BI

Wetland Delineation ID	Wetland Type (1)	Temporary Wetland Impact (acres)	Permanent Wetland Impact (acres)	Permanent Wetland Forest Conversion (acres)	Facilities Crossing Resource (3)
Wetland SS	PEM	0.00	--	--	BI
Wetland VV	PFO	--	--	0.02	BI
Wetland CCC	PEM	0.06	--	--	BI
Wetland DDD	PFO	--	0.01	--	AR
Wetland FFF	PEM	0.00	0.02	--	AR
Wetland III	PEM	0.01	--	--	BI
Wetland JJJ	PEM	0.15	--	--	BI
Wetland KKK	PFO	--	--	0.01	BI
Wetland OOO	PSS	0.1	--	--	BI
Wetland PPP	PEM	0.03	--	--	BI
Wetland QQQ	PEM	0.13	--	--	BI
Wetland RRR	PEM	0.02	--	--	BI
Wetland SSS	PEM	0.05	--	--	BI
Wetland TTT	PEM	0.01	--	--	BI
Wetland UUU	PEM	0.02	--	--	BI
Wetland VVV	PEM	0.02	--	--	BI
Wetland ZZZ	PEM	0.32	--	--	BI
Wetland 4A	PEM	0.51	--	--	BI
Wetland 4D	PFO	--	0.01	0.04	AR
	Totals	1.90	0.41	0.67	

(1) PEM = palustrine emergent marsh, PSS = palustrine scrub shrub, PFO = palustrine forested, WM = wet meadow, OW = open water, R3 = riverine perennial, R4 = riverine intermittent, RE = riverine ephemeral.
(2) Permanent impacts to NYSDEC regulated wetlands and adjacent areas are associated with OI structures only and are anticipated to total less than 10 square feet and 20 square feet, respectively.
(3) BI = buried interconnect, AR = access road, LA = laydown area, OM = Operations & Maintenance Building.

(n) Measures to Avoid/Mitigate Wetland Impacts

Avoidance and Minimization

In order to avoid wetland impacts to the greatest extent practicable, the Applicant requested EDR to conduct a field-based reconnaissance level investigation of wetlands within the preliminary Facility layout in December 2017, utilizing the methodology described in 1001.22(i) above to identify wetland and stream resources within the Facility Site. The results of this survey were used to inform Facility design, and the revised Facility layout achieves this by locating turbines outside of wetlands, routing access roads and collection lines around wetlands where practicable,

and utilizing existing crossings. As a result, further changes were made to the Facility layout to minimize wetland impacts, reducing wetland impacts to 2.98 acres, and permanent impacts to less than 0.5 acre. Where avoidance was not practicable due to practical constraints (topography or land ownership) or conflicts with other sensitive resources (such as stone landscapes), narrow portions of the wetlands were chosen for crossing locations. As indicated in Table 22-7 above, wetland impacts have been avoided and minimized substantially.

As noted above, a number of changes were made to the Facility throughout the design process in order to avoid and minimize wetland impacts. For example, access roads and collection lines to T5 and T6 were completely rerouted to avoid impacts to wetlands that were identified during the reconnaissance survey. Two turbines in the preliminary design were completely removed to avoid wetland impacts. As the layout of Facility components developed, more specific measures were taken by the Applicant to avoid and minimize impacts to environmental resources. For example, following the completion of wetland delineations, access road G was rerouted to avoid impacts to wetlands 4A, 3B, and 3A. Access roads were rerouted to avoid impacts to wetlands K, VV, and XX, within which potential vernal pools were identified. Additional access roads, substation boundaries and collection lines were shifted multiple times to avoid and minimize wetland impacts. See Exhibit 9(b) for further details regarding avoidance and minimization of wetlands through Facility design.

A number of site specific actions are proposed that will minimize indirect impacts to wetlands that could not be avoided. Indirect impacts that could result from construction include siltation and degradation of downstream water quality. These impacts are not anticipated as a result of this Facility, because the Applicant will take appropriate measures to prevent these impacts, including implementing a SWPPP. Specific minimization measures for indirect impacts to wetlands include:

- *No Equipment Access Areas:* Except where crossed by permitted access roads or through non-jurisdictional use of temporary matting, wetlands will be designated "No Equipment Access," thus prohibiting the use of motorized equipment in these areas.
- *Restricted Activities Area:* A buffer zone of 100 feet, referred to as "Restricted Activities Area," will be established where Facility construction traverses wetlands and other bodies of water. Restrictions will include:
    - No deposition of slash within or adjacent to a waterbody;
    - No accumulation of construction debris within the area;
    - Herbicide restrictions within 100 feet of a wetland (or as required per manufacturer's instructions);
    - No equipment washing or refueling within the area;
    - No storage of any petroleum or chemical material; and
    - No disposal of excess concrete or concrete washwater.

- *Sediment and Siltation Control*: A soil erosion and sedimentation control plan will be developed and implemented as part of the SPDES General Permit for the Facility. Silt fences, hay bales, and temporary siltation basins will be installed and maintained throughout Facility construction. Exposed soil will be seeded and/or mulched to assure that erosion and siltation is kept to a minimum along wetland boundaries. Specific control measures are identified in the Facility's Preliminary SWPPP, and the location of these features will be indicated on construction drawings and reviewed by the contractor and other appropriate parties prior to construction. These features will be inspected on a regular basis to assure that they function properly throughout the period of construction, and until completion of all restoration work.

Mitigation

A total of 0.42 acre of wetlands will be lost as a result of Facility construction and operation, which will be offset through compensatory mitigation. No State regulated wetlands will be impacted by the Facility as the crossing of potential state-regulated Wetland M will be completed via trenchless technologies (see Preliminary Design Drawings, Exhibit 11). Therefore, compensatory mitigation to offset impacts to federally regulated wetlands will be required as part of the federal wetland permitting process under the Nationwide Permit Program. To accomplish this mitigation, the Applicant is proposed to purchase of wetland mitigation credits under an In-Lieu Fee Program (ILFP) approved by the U.S. Army Corps of Engineers. The Wetland Trust (TWT) is a 501(c)3 nonprofit corporation that has established an ILFP in 15 service areas in the Susquehanna River headwaters and adjacent basins. The Applicant has been in contact with the TWT throughout the public involvement process, and will continue to coordinate with this group as part of future permitting efforts. The U.S. Army Corps of Engineers will determine the number of credits that will be required to offset wetland impacts to jurisdictional wetlands, and once the transaction is completed, the Applicant will have fulfilled all wetland mitigation requirements. The TWT will be responsible for the creation of high quality wetlands within the Susquehanna Rivershed and the long-term success of the wetlands that the credits purchased by the Applicant represent.

(o) State and Federal Endangered or Threatened Species

Please see the discussion of state and federal threatened and endangered species documented within or adjacent to the Facility Site, along with potential impacts and mitigation for such species, in Section (f). Discussion of mitigation for wildlife and wildlife habitat is provided in Section (g). These measures will also mitigate impacts to threatened and endangered species, even though it is not specific to such species. Measures to mitigate impacts specifically to state-threatened and endangered species that are found within the Facility Site are discussed in Section (h)(3); and further detailed in the NCBP (Appendix TT).

(p) Invasive Species Prevention and Management Plan

Please see Section (b) above for a discussion of invasive species prevention and management. Additionally, an Invasive Species Control Plan (ISCP) is provided in Appendix MM.

(q) Agricultural Impacts

Based on NCLD cover types and a review of aerial imagery, there is a total of 249 acres of agricultural land within the Facility Site. Construction of the Facility is anticipated to result in 34.4 acres of temporary impacts and 8.0 acres of permanent impacts to agricultural land (see Exhibit 4). A number of minimization and mitigation measures will be implemented to offset these impacts. See Exhibit 4(i) for a complete list of measures that will be implemented to minimize and mitigate impacts to agricultural land. The Applicant will consult with NYSDAM during construction if deviation from the *Guidelines* is necessary. Specific to agricultural land impacted by the Facility, the Applicant will provide a monitoring and remediation period of no less than two years immediately following the completion of initial restoration. The two-year period will allow for the effects of climatic cycles such as frost action, precipitation, and growing seasons to occur, from which various monitoring determinations can be made. The monitoring and remediation phase will be used to identify any remaining agricultural impacts associated with construction that need mitigation and to implement the follow-up restoration.

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