EIGHT POINT WIND ENERGY CENTER

Case No. 16-F-0062

1001.22 Exhibit 22

Terrestrial Ecology and Wetlands

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Exhibit 22: Terrestrial Ecology and Wetlands

22(a) Plant Communities

The Project Area resides within the Northern (High) Allegheny Plateau ecological region. This ecoregion resides along the southern tier of New York and the northern tier of Pennsylvania. A small portion of northwest New Jersey is also included in this large ecoregion. This ecoregion is defined by high elevation features at the northern end of the Appalachian Plateau. Most of this ecoregion is above 1,200 feet and the general land form of the area is mid-elevation hills separated by numerous narrow stream-cut valleys. This ecoregion is over 16.9 million acres in area and has the second highest percentage of natural cover (81%) of any Northeastern ecoregion (Zaremba, Anderson et al., 2003). Within the ecoregion, deciduous forest covers 52%; 21% is covered by mixed forests, coniferous forests cover 6%; and only 0.7% of the ecoregion is covered by wetlands. Agricultural uses account for 18% of the total land cover (Zaremba, Anderson et al., 2003). Dairy farms are the principle agricultural use with row crops fields limited to the floodplains of river valleys and also tablelands located amongst hilltops. Currently only 1% of the ecoregion is covered by residential and urban development. More specifically, within this ecoregion, the Project Area resides in the Glaciated Low Allegheny Plateau and the Glaciated Hills sub-ecoregions. The Glaciated Low Allegheny Plateau is a wide-ranging, uniform area which covers much of the Northern Allegheny Plateau of New York. This sub-ecoregion consists of a mosaic of farmland and forestland situated on a low and rolling hillscape. The smooth terrain has been worn through glaciation creating flat hilltops and wide river valleys. Common plant communities alternate between Appalachian oak-pine forest on drier, rocky slopes, and northern hardwoods-conifer forest in ravines, valleys, riparian areas, and on generally moist slopes (Edinger et al., 2014). Most hilltops and river valleys within this plateau have been clear-cut and converted to agriculture while the steeper slopes remain forested.

The Glaciated Allegheny Hills ecoregion has higher elevations on average. These elevation levels are caused by a dominant strata of sandstone and shale which was more resistant to glaciation and weathering events in the past. The Glaciated Allegheny Hills ecoregion is deeply dissected. Soils are known to be stony, acidic, low in fertility, and often found on steep slopes. The soil, climate, and rugged topography make the region more suited to tree growth than agriculture. This is reflected in the ecoregion by being predominantly forested throughout. Hardwood forests, particularly northern hardwood forest communities, are the most dominant. Appalachian oak forest are also known to occur on more dry or south-facing slopes in the region (Edinger et al., 2014).

The Project Area encompasses approximately 15,295 acres and is composed of predominately deciduous forest and agricultural land. Agricultural areas consists of predominately hay, corn, wheat, and soy crops. Other open fields were maintained for pasture and livestock grazing. Land cover in the Project Area was spatially determined using the Cropland Data Layer (CDL) data set compiled by the United States Department of Agriculture (USDA). Within this data set, the Project Area is defined to be primarily deciduous forest (61%), agricultural land (22%), and herbaceous grassland (10%) (See Table 22-1 below). Additionally, the Project Area includes coverages of scrub/shrub (approximately 3%) and developed lands (approximately 3%) to a marginal extent. Lastly, barren land (exposed rock, sand, or clay), open water, and wetland features all comprise less than 1% of the Project Area. See Figure 22-1

for representative mapping of plant communities, and Table 22-1, below, for acreages within the Project Area.

Table 22-1. Land Cover Types within the Project Area

Cover Type	Acreage	% of Project Area
Forests	7,944.32	51.95
Pasture/Hay	3,675.26	24.04
Cultivated Crops	2,392.96	15.65
Shrub/Scrub	597.42	3.91
Developed	484.42	3.17
Herbaceous and Woody Wetlands	137.98	0.90
Open Water	44.67	0.29
Barren Land (Rock/Sand/Clay)	7.06	0.05
Grassland/Herbaceous	5.78	0.04
Total	**15,289.87**	**100%**

Specific plant species and general plant communities were documented during on-site field survey work conducted in the summer and fall of 2016 and spring of 2017. Nomenclature used during the documentation of plant communities and plant species adhered to designations put forth in both the *New York Flora Atlas* (Weldy et al., 2016) and in *Ecological Communities of New York* (Edinger et al., 2014). During the field effort, a species inventory and general plant communities survey was conducted and identified plant species that were discernable while walking through impact survey areas and plant communities established within the Project Area. A total of 225 endemic and invasive plant species were documented within this effort. A plant list was created based off of this field effort and is included in this application attached as Appendix 22-1.

The creation of plant community mapping was based on a myriad of input sources. Sources include data collected during on-site field survey work, roadside observation, desktop analysis, and interpretation of aerial orthoimagery. All plant communities documented to occur within the Project Area are common communities found in New York. A description of dominant plant species found within these ecological communities is provided below. Descriptions of specific wetland community types encountered on-site are provided in detail in Section 22(k) below.

Forests

Forestland covers the vast majority of the Project Area, encompassing 51.95% of the total land coverage. Within this cover type are a variety of forested communities with distinguishing characteristics and which support vast assemblages of interacting plant and animal populations. Forest communities found within the Project Area and their general descriptions are below.

Appalachian oak-hickory forest - This hardwood forest occurs on the ridgetops, upper slopes, and on the south- and west-facing slopes of hills and mountains. Soils are well-drained and normally have a sandy-loam or general loam texture. Appalachian oak-hickory forest is very common in the Project Area. Dominant trees in this community include a co-dominance between red oak (*Quercus rubra*) and white oak (*Quercus alba*) species. Mixed with these oaks at lower densities are shagbark hickory (*Carya ovata*) and even scarcer occurrences of sweet pignut hickory (*Carya ovalis*). Red maple (*Acer rubrum*), white ash (*Fraxinus americana*), and hop hornbeam (*Ostrya virginiana*) also occur as common associates in this forest. The shrub layer of this forest includes saplings of the aforementioned tree species and also choke cherry (*Prunus virginiana*), red raspberry (*Rubus idaeus*), serviceberry (*Amelanchier arborea*), witch hazel (*Hamamelis virginiana*), and gray dogwood (*Cornus racemosa*). Characteristic ground layer herbs are Pennsylvania sedge (*Carex pensylvanica*), false Soloman's seal (*Maianthemum racemosum*), wild sarsaparilla (*Aradia nudicaulis*), black cohosh (*Cimicifuga racemosa*), rattlesnake root (*Prenanthes alba*), silver-rod (*Solidago bicolor*), and mayapple (*Podophyllum peltatum*).

Appalachian oak-pine forest - Appalachian oak-pine forest occurs within the Project Area to a lesser extent. This community is a mixed forest occurring on well-drained sandy or rocky soils on the slopes of ravines, hills, and mountain tops. Dominant trees in this community include a mixture of oak and pine species such as red oak (*Quercus rubra*), white oak (*Quercus alba*), and white pine (*Pinus strobus*) with pitch pine (*Pinus rigida*) occurring to a lesser extent. Common associates which occur at lower densities are red maple, eastern hemlock (*Tsuga canadensis*), American beech (*Fagus grandifolia*), and black cherry (*Prunus serotina*). The shrub layer of this forest includes saplings of the aforementioned tree species and also serviceberry, witch hazel, and maple-leaf viburnum (*Viburnum acerifolium*). Characteristic ground layer herbs are Pennsylvania sedge, Canada mayflower (*Maianthemum canadense*), bracken fern (*Pteridium aquilinum* var. *latiusculum*), and various wood ferns (*Dryopteris intermedia, D. marginalis*).

Beech-maple mesic forest - Beech-maple mesic forest is also very common within the Project Area. This community occurs on moist well-drained soils with usually an acidic content. This forest is described as a northern hardwood forest with sugar maple (*Acer saccharum*) and American beech occurring codominant with each other. Common associates which occur in the community to a lesser extent are yellow birch (*Betula alleghaniensis*), white ash, hop hornbeam, and red maple. Eastern hemlock may occur at very low quantities as well. The shrub layer of this forest includes saplings of the aforementioned tree species and also hobblebush (*Viburnum lantanoides*), American hornbeam (*Carpinus caroliniana*), and witch hazel. Saplings of sugar maple and American beech scatter the ground layer along with Canada mayflower, christmas fern (*Polystichum acrostichoides*), various wood ferns, white wood aster (*Eurybia divaricata*), trilliums (*Trillium undulatum, T.erectum*), trout lily (*Erythronium americanum*), white snakeroot (*Ageratina altissima* var. *altissima*), Pennsylvania sedge, and common wood-sorrel (*Oxalis montana*).

Hemlock-northern hardwood forest – Hemlock-northern hardwood forest is a common coniferous forest community found within the Project Area. These forest communities are mixed and generally occur on the middle to lower cool slopes of shaded ravines and hillslopes. These communities occur on moist, well-drained loamy soils. Eastern hemlock is predominant within the tree stratum and can range in coverage from pure stands to comprising only 20% of the tree canopy. Along with eastern hemlock, there is an assortment of tree species which can act as a codominant within this community. Relative to the Project Area, sugar maple, red maple, yellow birch, red oak, American beech, white ash, white oak, white pine, American basswood (*Tilia americana*), and black cherry (*Prunus serotina*) have been observed to be codominant tree species. Within the shrub layer, striped maple (*Acer pensylvanicum*) is a common species witnessed in this community. Along with the saplings of the aforementioned canopy trees, witch hazel, hobblebush, maple-leaf viburnum, lowbush blueberry (*Vaccinium pallidium*), and a range of raspberries (*Rubus* spp.) populate the shrub layer. Due to the low light environment created by the hemlock dominant tree stratum, the ground layer of this community is generally sparse. However, when present, ground layer herbaceous species include various wood ferns, Christmas fern, Pennsylvania sedge, trillium species, round-leaf violet (*Viola rotundifolia*), common wood-sorrel, and lady fern (*Athyrium filix-femina*). When pockets of sunlight do penetrate the upper canopy and reach the ground layer, New York fern (*Thelypteris noveboracensis*) and hay-scented fern (*Dennstaedtia punctilobula*) can also be found.

Successional northern and southern hardwoods - Successional forests are common throughout the Project Area. A majority of the forestlands within the Project Area have been cleared for agriculture in the past or were historically utilized for timber production, with operations continuing to a lesser extent into the present day. Successional forests can develop either after man-made clearing events or in the wake of destructive natural events (floods, blow-downs during high wind events, forest fires, etc.). After clearing has occurred, and the impacted land begins to revert back to forests, plant species which are well-adapted to establishment after disturbances begin to populate the area. Northern successional hardwoods occur north of the coastal lowlands ecozone and southern successional hardwoods occurs in the southern half of New York. As such, both successional forest community types occur within the Project Area.

Characteristic trees dominating successional northern hardwoods within the Project Area include quaking aspen (*Populus tremuloides*), gray birch (*Betula populifolia*), black cherry, red maple, and white pine. White ash, green ash (*Fraxinus pennsylvanica*), and American elm (*Ulmus americana*) can be found in this community as well but at lesser numbers.

Characteristic tree species found within successional southern hardwood forests within the Project Area include American elm, slippery elm (*Ulmus rubra*), white ash, red maple, box elder (*Acer negundo*), silver maple (*Acer saccharinum*), sassafras (*Sassafras albidum*), gray birch, and hawthorn species (*Crataegus* spp.). Black locust (*Robina pseudo-acacia*) and European buckthorn (*Rhamnus cathartica*) are introduced species and were noted to occur within this forest community.

Floodplain forest – This diverse forested wetland community occurs on mineral soils within low terraces of river floodplains and also along river deltas. Floodwaters and trapped surface water flows inundate these forests for a duration of the year. Some floodplain forests can become completely dry in certain times of the year, while other areas are regularly flooded or inundated. Cyclic inundation or flooding

events aids in the formation of hydric soils which in turn allows for the proliferation of hydrophytic (i.e., water-tolerant) plant species within the community. Characteristic trees within floodplain forests include silver maple, green ash, eastern cottonwood (*Populus deltoides*), red maple, box elder, American elm, hickories (*Carya cordiformis, C. ovata, C. laciniosa*), American sycamore (*Plantanus occidentalis*), various oaks (*Quecus bicolor, Q. palustris*), and river birch (*Betula nigra*). Characteristic shrub species include spicebush (*Lindera benzoin*), American hornbeam, meadowsweet (*Spiraea alba* var. *latifolia*), winterberry, speckled alder (*Alnus incana*), gray dogwood (*Cornus racemosa*), silky dogwood (*Cornus amomum*), nannyberry (*Viburnum lentago*), and southern arrowwood (*Viburnum dentatum*). Shrubs also include the saplings of the aforementioned canopy trees. Characteristic herbs include sensitive fern, jewelweed (*Impatiens capensis*), ostrich fern (*Matteuccia struthiopteris*), late goldenrod (*Solidago gigantea*), false nettle (*Boehmeria cylindrica*), jumpseed (*Persicaria virginiana*), moneywort (*Lysimachia nummularia*), various sedges (*Carex* spp.), garlic mustard (*Alliaria petiolata*), rice cutgrass (*Leersia oryzoides*), and skunk cabbage (*Symplocarpus foetidus*) among many others.

Red maple-hardwood swamp – Red-maple swamps occur to a marginal extent within the Project Area. This community is a hardwood swamp which occurs in poorly drained depressions with mainly mucky loamy soil content. This swamp can be permanently flooded or seasonally inundated and containing hummocks and hollows throughout the understory. Red maple is typically the dominant tree species within the upper canopy. Other species known to be codominant include green ash, white ash, American elm, slippery elm (*Ulmus rubra*), yellow birch (*Betula alleghaniensis*), swamp white oak (*Quercus bicolor*), and white pine to a lesser extent. Shrub layers within this community can be dense. Characteristic shrubs include saplings of canopy species along with winterberry, spicebush, speckled alder, nannyberry, arrow wood, highbush blueberry (*Vaccinium corymbosum*), and various dogwoods. The herbaceous layer is quite diverse and is dominated by primarily ferns, including sensitive fern, cinnamon fern (*Osmunda cinnamonea*), royal fern (*Osmunda regalis*), marsh fern, and spinulose wood fern (D*ryopteris carthusiana*). Other herbaceous species include skunk cabbage, jewelweed, sedges, false nettle, and marsh marigold (*Caltha palustris*).

Hemlock-hardwood swamp - This community describes a very common forested wetland within the Project Area. This type of swamp occurs on deep and mucky mineral soils and resides in depressions which receive hydrological input from groundwater discharge (springs or seeps) and also inundation resulting from local precipitation events. Water levels in these swamps can fluctuate and they can be flooded in spring and relatively dry in the ensuing summer months. Due to the prevalence of eastern hemlock in the upper canopy, this community generally has a sparse shrub and herbaceous layer (and limited species diversity) due to the closed and shaded canopy. As stated previously, the tree canopy is dominated by eastern hemlock. Some codominant tree species can be present and they normally include yellow birch, white pine, green ash, and red maple. Saplings of the aforementioned canopy trees typically dominate the shrub layer. Other shrubs species can include highbush blueberry, various viburnums, winter berry, and mountain holly (*Nemopanthus macronatus*). Characteristic herbaceous species include cinnamon fern, sensitive fern, sedges, Canada mayflower, and common wood-sorrel. Groundcover is fairly sparse and peat mosses (*Sphagnum* spp.) may be present and form a thin layer of moss over some portions of the ground layer.

Successional Shrubland

Successional shrubland is present in moderate numbers, covering approximately 3.91% of the Project Area. This community represents shrublands which have established after a site has been cleared (for agriculture, logging, or development) or was disturbed as a result of natural events. This community is defined by at least a 50% cover of shrub species (Edinger et al., 2014). Successional shrublands are transitory communities between old-field and successional forest communities. Characteristic shrubs found within the Project Area are gray dogwood, common serviceberry, southern arrowwood, rambler rose (*Rosa multiflora*), Allegheny blackberry (*Rubus allegheniensis*), choke cherry (*Prunus virginiana*), wild plum (*Prunus americana*), nannyberry, silky dogwood, red osier dogwood (*Cornus sericea*), European buckthorn, oneseed hawthorn (*Crataegus monogyna*), various shrub willows (*Salix* spp.), and bush honeyscukles (*Lonicera* spp.). Herbaceous species are very diverse in this community but only represent less than 50% of total vegetative cover. Within the Project Area, common herbaceous plants within this community were goldenrods (*Solidago* spp.), raspberries, Queen Anne's lace (*Daucus carota*), meadowsweet, a variety of asters (*Symphyotrichum* spp.), common burdock (*Arctium minus*), and various grasses (*Dactylis* spp*., Poa* spp.).

Successional Old-field

Successional old-fields are relatively uncommon within the Project Area and cover approximately 0.04%. This community is defined as a meadow dominated by forbs and grasses that occur on sites which have been cleared or plowed as a result of agriculture or development, and then left abandoned. Most old-field communities are irregularly and infrequently mowed. As such, conditions favor the establishment and spread of representative old-field species. Characteristic herbaceous species include many goldenrods, timothy grass (*Phleum pretense*), smooth brome (*Bromus inermis*), old-field cinquefoil (*Potentilla simplex*), various asters, Queen Anne's lace, wild strawberry (*Fragaria virginiana*), common dandelion (*Taraxacum officinale*), common burdock, common milkweed (*Asclepias syriaca*), chicory (*Cichorium intybus*), and cow vetch (*Vicia cracca*). Shrubs can be present within successional old-field communities but represents less than 50% of the community collectively. Common shrubs found in this community are honeysuckles, various dogwoods, viburnums, and small willows.

Open Water

Open water communities are somewhat sparse within the Project Area covering approximately 44.67 acres (i.e., less than 1% of Project Area). Open water areas are characteristic of man-made and natural lacustrine and riverine systems located within the Project Area. Lacustrine systems (i.e., relating to ponds and lakes) within the Project Area include artificial impoundments, farm ponds, and natural ponds. Specific riverine systems (i.e., relating to confined waterbodies) generally refer to ephemeral drainages, intermittent streams, and perennial streams. Although aquatic vegetation grows within some of these communities, emergent wetland vegetation often grows along the periphery of these communities as well. Typical emergent wetland species associated with open water communities within the Project include cottongrass bulrush (*Scirpus cyperinus*), sedges and rushes (*Juncus* spp.), reed canary grass (*Phalaris arundinacea*), common boneset (*Eupatorium perfoliatum*), spotted joe-pye weed (*Eutrochium maculatum*), rice cut grass, sensitive fern, late goldenrod, broad leaf cattail (*Typha latifolia*), and American manna grass (*Glyceria grandis*) amongst others.

Agricultural Land

Active agricultural land in the form of hay fields, pastureland, and cultivated crops is common within the Project Area. This community type covers approximately 6,068.22 acres or 39.69% of the Project Area. In reference to *Ecological Communities of New York*, there were multiple types of terrestrial cultural communities within the Agricultural Land designation, including cropland/row crops, cropland/field crops, and pastureland (Edinger et al., 2014). Most row crops established within the Project Area are corn (*Zea mays*), which is utilized as feedstock, livestock feed, or for human consumption. Hay fields are also scattered throughout the Project Area and are utilized as green chop or open pasture land for roaming livestock.

Developed Land

Developed lands cover approximately 484.42 acres of Project Area, which equates to roughly only 3.17% of the total land coverage. Most of the landscape within the Project Area is rural in nature, so developed lands are relatively sparse. Developed lands represent areas with extreme anthropogenic influence and are characterized by the presence of buildings, roadways, quarries, residential areas, commercial properties, industrial sites, and maintained greenspaces (mowed lawns, gardens, parks, etc.). Vegetation within these areas tend to be sparse when not artificially planted or influenced. However, when present, certain species which thrive in disturbed environments act as pioneer species, or become directly or indirectly introduced, tend to propagate within disturbed areas. Often in developed areas non-native plant species flourish in a community which generally characterizes old-field appearances and functions. Non-native species such as ragweed (*Ambrosia artemesiifolia*), Canada thistle (*Cirsium arvense*), bull thistle (*Cirsium vulgare*), rambler rose, European buckthorn, amur honeysuckle (*Lonicera maackii*), cut-leaf teasel (*Dipsacus laciniatus*), common mullein (*Verbascum thapsus*), purple loosestrife (*Lythrum salicaria*), and various upland grasses generally populate these developed areas.

22(b) Impacts to Plant Communities

Temporary, and then relatively small permanent impacts to the aforementioned ecological communities will occur as a result of construction and operation of the Project. Areas that are temporarily impacted will be restored to their original condition to the extent practicable. Impacts to ecological communities and associated plant communities will occur through the clearing of vegetated areas to allow for safe and effective Project related construction and activities. Also, a permanent impact of plant communities will occur in areas that are constructed for permanent operation of the Project. Calculation of specific impacts to these communities within the Project Area are based on assumed disturbance areas assigned to each Project component. These assumed disturbance areas are described in Table 22-2: Impact Assumptions below.

Table 22-2. Impact Assumptions

Project Components	Assumed Vegetative Clearing Area	Assumed Soil Disturbance Area	Area of Permanent Impact
Wind Turbine (construction and operation)	Variable for each turbine; approx. 250' radius	Variable for each turbine; approx. 250' radius	0.065 acre per turbine (pedestal plus access ring – no crane pad)
Access Road	60' wide per linear foot of road	30' wide per linear foot of road	16' wide per linear foot of road
115 kV Transmission Line (overhead)	100' wide per linear foot of line	0.23 acre per support structure	0.01 acre per support structure
Buried Electrical Collection Line	Up to 50' wide per linear foot of line	Up to 50' wide per linear foot of line	None
Overhead Electrical Collection Line	Up to 50' wide per linear foot of line	Up to 50' wide per linear foot of line	0.01 acre per support structure
Meteorological Towers	1 acre per tower	1 acre per tower	0.01 acre per tower
O&M Building	2.5 acres	2.0 acres	1.75 acres
Staging / Laydown Area	10 - 15 acres per staging area	10 - 15 acres per staging area	None
Collection Substation	1.0 acre	1.0 acre	0.6 acre

These above-mentioned impact assumptions were utilized when calculating both the temporary and permanent impact to plant communities, which will occur during the construction and operation phases of the Project. Although there will be components which will be collocated through portions of the Project, impact assumptions are specifically calculated by component only. As such, impact calculations were completed in a conservative manner as the potential for overlap in component impact areas is not assumed in the calculations. This method of impact calculation also alleviates temporal variation of impacts to vegetative communities within the Project Area. Various Project components sharing the same general area may be constructed at different times due to construction procedure. This process may cause a re-disturbance of the same vegetative communities and, as a result, a prolonged impact. It should be stated that the regrowth rate of forests and select shrubland communities are delayed. As such, utilizing this impact calculation method in forested and select shrubland communities supports the conclusion that this calculation method is a conservative approach.

Approximately 506.8 acres of plant communities will be disturbed as a result of construction and operation of the Project. Plant community impacts are proposed to occur in approximately 3.13% of the total Project Area. Of this impact amount, approximately 477 acres will be only temporary impacted. Temporary impacts include the burying of underground collection lines, clearing along the margins of access roads and turbine workspaces required for construction, and the construction and utilization of staging areas during construction. Approximately 29.8 acres will be permanently impacted and will be converted into build components of the Project. Permanent impacts to plant communities will occur to up to 0.19% of the total Project Area. Permanent impacts will result from the construction of new access roads, turbine and meteorological tower foundations/pads, transmission line and overhead collection line pole structure placements, an O&M facility, and the collection substation. Individual impact discussions on general land cover types are discussed in detail below.

The clearing of forestland cover types within the Project are unavoidable due to the vast majority of the Project Area being dominated by forest communities. There are four different types of impacts which can occur to these communities. These types are permanent impacts, temporary impacts, conversion impacts, and fragmentation impacts. Permanent impacts occur where forestland will be directly replaced with Project components. There will be approximately 8.6 acres of permanent impact to forestlands within the Project Area. Second, temporary impacts could occur. Temporary impacts will occur to approximately 147.7 acres of forestland within the Project Area. Temporary impacts are those impacts which will result in initial clearing and disturbance of forests but will be allowed to revegetate after Project construction has completed. Over time, ecological succession of forests will occur in these temporary impact areas. Forest conversion impacts will also occur within the Project Area. Forest conversion will occur where forestland is initially cleared for purposes of Project construction and then would be maintained as successional communities for the life of the Project due to clearance constraints. Forest conversion is anticipated to occur in approximately 47 acres of forestland in the Project Area. The Applicant plans to only remove stumps of forest species where the placement of components are intended to occur.

Forest fragmentation is a form of habitat fragmentation where forest areas are broken up into smaller, isolated patches of forest known as forest fragments. This process can result from the creation of natural open areas, new farmland expanses, creation of new road corridors, or the establishment of developed areas. Through the proposed Project layout, 317 acres of newly created peripheral forest areas (forest within 300 feet of the forest edge) would be created. These new peripheral areas would be subject to a varying range of edge effects, or changes in animal and plant population or community structures that occur at the boundary of fragmented habitats. For more information on habitat fragmentation and edge effects as a result of the Project, please refer to the subheading *Operation Related Impacts to Vegetation, Wildlife, and Wildlife Habitat* within *22(f) Vegetation, Wildlife, and Wildlife Habitat Impacts* within this exhibit.

The second most land coverage within the Project Area is active agricultural land. Construction of the Project will result in a temporary disturbance of approximately 299.6 acres of vegetation associated with crops and pastures. Temporary impacts to agricultural land will occur from the siting of underground collection line(s) and the clearing of vegetation needed for various components during the construction phase of the Project. Temporarily disturbed active agricultural areas will have top soils stripped prior to construction. The topsoil will then be replaced upon completion of the construction phase of the

Project. This method will allow for crops and pasture lands to return to preexisting growth conditions overtime. A total of approximately 19.3 acres of agricultural land will be permanently lost due to the siting of Project components.

The construction of the Project will also result in the temporary disturbance of approximately 10.3 acres of successional shrubland communities, 19 acres of successional old-field communities, and zero acres of developed land communities. Temporary impacts will occur as a result of initial clearing and disturbance of these cover types for purposes of construction access, the siting of Project components, and also the burying of underground collection lines. However, after construction of the Project has ceased and the Project becomes operational, these areas will be left to revegetate or otherwise return to their preexisting condition. Permanent loss will occur to approximately 0.6 acres of successional shrubland communities, 1.3 acres of successional old-field communities, and zero acres of developed land communities. Permanent loss of these cover types will occur from the siting of Project components as with all other aforementioned permanent impacts resulting from the Project.

It is anticipated that no impacts will occur to open water vegetation communities within the Project Area. A description of impacts to all surface waters within the Project Area is included in Exhibit 23 of this Application, and also in the Wetland and Waterbody Delineation Report (Appendix 22-2). The amount of temporary, permanent, and conversion impacts to the representative plant communities within the Project is not expected to result in the significant loss of, or extirpation to, any representative plant community on-site. A table depicting the temporary, permanent, and conversion impact acreages to each representative community on site is provided below.

Table 22-3. Vegetation Impact Calculations

Cover Type	Temporary Impact (Acres)	Permanent Loss (Acres)	Forest Conversion (Acres)	Total Impact (Acres)
Forestland	147.7	8.6	47	156.3
Successional Shrubland	10.3	0.6	N/A	10.9
Successional Old-Field	19	1.3	N/A	20.3
Open Water	0	0	N/A	0
Agricultural Land	299.6	19.3	N/A	318.8
Developed Land	0.5	0	N/A	0.5
Total	**477**	**29.8**	**47**	**506.8**

Outside of a direct and physical impact to local vegetation communities through construction, the disturbance of naturally occurring ecologies can occur through the introduction of non-native species. While all species compete in the environment to survive, non-native or invasive species, appear to have specific traits or specific combinations of traits that allow them to outcompete native species. As invasive species spread, native species begin to reduce in population as suitable habitat and nutrient resources become more limited. During the plant species survey conducted within the summer and fall of 2016, and spring of 2017, a total of 12 invasive plant species were observed within the anticipated limits of disturbance for the Project (or within alternative locations previously considered for Project components). These species are included in the *New York State Prohibited and Regulated Invasive Plants* (New York State Department of Environmental Conservation [NYSDEC], 2014) and below, as follows:

- Amur honeysuckle (*Lonicera maackii*)
- Autumn olive (*Elaeagnus umbellata*)
- Black locust (*Robina pseudoacacia*)
- Canada thistle (*Cirsium arvense*)
- Common buckthorn (*Rhmanus cathartica*)
- Cut-leaf teasel (*Dipsacus laciniatus*)
- Garlic mustard (*Alliaria petiolata*)
- Morrow's honeysuckle (*Lonicera morrowii*)
- Purple loosestrife (*Lythrum salicara*)
- Rambler rose (*Rosa multiflora*)
- Reed manna grass (*Glyceria maxima*)
- Smooth buckthorn (*Rhamnus frangula*)

As part of the Application and in preparation for construction, an Invasive Species Control Plan (ISCP) has been prepared to describe the survey methods which were utilized to identify invasive species populations currently present on-site (Appendix 22-3). This management plan also includes proposed control procedures of current and introduced invasive populations, including locating and identifying target species, an establishment of removal protocol, inspection of construction materials (including fill) and equipment, equipment cleaning, and site restoration. The ISCP also discusses in detail the monitoring methods which will take place during the construction phase of the Project. As part of the on-site monitoring effort, management guidelines will be established and strictly adhered to. This will be done in order to ensure that all Project workers are informed of the threat of spreading invasive species and be educated on the best management practices (BMPs), which will be implemented during construction and restoration of the Project.

The Applicant anticipates that post-construction monitoring will occur over a two (2) year period. Should new occurrences of invasive species become established, the ISCP contains a treatment plan to control the introduction and spread of invasive species. Due to invasive species outcompeting native species, invasive populations may naturally increase in distribution and density over time. However, the general goal for the ISCP is to prevent an increase in invasive species population size or density as a direct or indirect result of the Project. Should the ISCP fail due to an unforeseen circumstance, a revised management plan will be written with new guidelines and/or protocols in order to create an adaptable and responsive management framework.

22(c) Avoidance and Mitigation Measures for Vegetation Impacts

Initial mitigation efforts have been undertaken through the application of attentive site planning. During the design phase of the Project, special consideration was given to avoid unnecessary impacts to forestland, active agricultural land, wetlands, and waterbodies. As a result, impacts to these landscape features (and vegetative communities) will be marginal. The Project components have been sited in order to confine disturbances to the smallest area possible. Existing natural and man-made corridors through forestland, existing farm lanes, and logging roads have been utilized for access when possible, and work areas have been adjusted to utilize open fields to the extent possible.

A comprehensive erosion and sediment control plan will be developed and will be utilized during the construction and associated remediation phases of this Project in order to protect adjacent resources. See Exhibit 21 for detail and summary of the Preliminary Stormwater Pollution Prevention Plan (SWPPP).

Efforts to avoid, mitigate, or minimize impacts to vegetative communities will also occur by complying with guidance from environmental monitors, maintaining clean work sites, employing best management practices during construction, and also demarcating areas highly susceptible to adverse disturbances. These confined areas will be deemed inaccessible to construction equipment/vehicles and any other disturbance activity.

Through reference to online resources associated with the U.S. Fish and Wildlife Service (USFWS) Environmental Conservation Online System (ECOS) (USFWS, 2017), NYSDEC Environmental Resource Mapper (NYSDEC, 2017), and the U.S. National Wilderness Preservation System Map (Wilderness Institute, 2017), there are no known significant natural communities or habitats of special concern which are located within the Project Area. As such, the Applicant does not anticipate impacts to any Federal or State-listed significant natural community, habitat of special concern, U.S. National Wilderness Area, or USFWS-Critical Wildlife Habitat.

Following the construction phase of the Project, restoration of temporarily disturbed areas will take place. Temporarily disturbed areas will be seeded with native (other than impacted agricultural areas) and typical wetland and/or upland seed species mixes. These seeded areas will be stabilized with mulch and/or straw and left to reestablish preexisting vegetative coverage in these areas.

As stated previously, BMPs will be implemented by the Applicant in accordance with the ISCP (Appendix 22-3) to prevent the introduction of invasive species to the Project Area and impede the spread of current invasive species populations within the Project Area.

22(d) Characterization of Vegetation, Wildlife, and Wildlife Habitats

(1) Plant Community Descriptions

See a discussion of plant communities encountered within the Project Area in Section 22(a) above. As mentioned above, a generated list of plant species encountered during surveys of the various Project layouts in 2016 and 2017 is included as Appendix 22-1.

(2) Discussion of the extent, methodology, and results of all avian and bat surveys

Please see section 24(d)(6) for more information regarding avian and bat surveys.

(3) Shapefiles for Locations of Project Components

Shapefiles depicting the location of all Project components including (separately): the extent of the current Project site; turbine locations; new and existing access and maintenance roads; electric collection and transmission lines (specified above ground and/or underground); laydown and storage area(s); substation(s); temporary and permanent meteorological tower(s); any other temporary or permanent infrastructure constructed in support of the Project; all areas to be cleared around turbines, access roads, electric lines, and all other Project components, were provided to the applicable agencies on August 18, 2017.

(4) Shapefiles for Wildlife Survey Locations

Shapefiles were also provided on August 18, 2017 depicting all wetland/waterbody and wildlife survey locations, including (separately): delineated wetland and waterbodies, wetland survey area, breeding bird survey transects; eagle/raptor survey locations; bat acoustic monitoring locations; winter raptor survey locations, and driving routes; radar unit location; and aerial nest survey area.

(5) Amphibians and Reptiles

Access to common reptile and amphibian species ranges in the State of New York is provided through use of the publically available "Amphibian and Reptile Atlas Project" (Herp Atlas Project) provided by the NYSDEC (2017).

The Herp Atlas Project was a 10 year survey that was designed to display the geographic distribution of select New York State herpetofauna. This research effort displayed results of approximatively 70 species of amphibians and reptiles in New York State. The unit of measurement for collecting Herp Atlas Project data is the USGS 7.5 minute topographic quadrangle. Based on the Amphibian and Reptile Atlas Project distribution maps provided by the NYSDEC, a range of reptile and amphibian species have been identified as occurring within the Greenwood and Rexville USGS 7.5 minute topographic quadrangles encompassing the Project Area. Based on reviewing data associated with the Project Area, reptile and amphibian species found occurring within the Project Area include:

- Spotted salamander (*Ambystoma maculatum*)
- Red-spotted newt (*Notophthalmus viridescens*)
- Northern dusky salamander (*Desmognathus fuscus*)
- Allegheny mountain dusky salamander (*Desmognathus ochrophaeus*)
- Northern redback salamander (*Plethodon cinereus*)
- Northern slimy salamander (*Plethodon glutinosus*)
- Wehrle's salamander (*Plethodon wehrlei*)
- Northern spring salamander (*Gyrinophilus porphyriticus*)
- Northern two-lined salamander (*Eurycea bislineata*)

- Eastern American toad (*Anaxyrus americanus*)
- Northern spring peeper (*Pseudacris crucifer*)
- American bull frog (*Rana catesbiana*)
- Green frog (*Rana clamitans melanota*)
- Wood frog (*Rana sylvatica*)
- Gray tree frog (*Hyla versicolor*)
- Northern leopard frog (*Rana pipiens*)
- Pickerel frog (*Rana palustris*)
- Shorthead garter snake (*Thamnophis brachystoma*)
- Common garter snake (*Thamnophis sirtalis*)
- Northern redbelly snake (*Storeria o. occipitomaculata*)
- Northern water snake (*Nerodia s. sipedon*)
- Smooth green snake (*Liochlorophis vernalis*)
- Eastern milk snake (*Lampropeltis t. triangulum*)
- Northern ringneck snake (*Diadophis punctatus edwardsii*)
- Common snapping turtle (*Chelydra s. serpentine*)
- Painted turtle (*Chrysemys picta)*

Reptiles are a very diverse class of fauna and include very mixed habitat preferences specific to their life cycles. It is presumed that representative reptiles can be found throughout the Project Area and in a myriad of microhabitats. Specifically, turtle and snake species are known to use a variety of habitats in New York, including emergent, scrub-shrub, forested, and open water wetlands; and upland areas, including woodlands, old fields, scrublands, meadows, and residential areas. Snakes tend to traverse and utilize a multitude of habitats. As such, snakes are presumed to occur throughout the Project Area. Semi-aquatic turtles which could occur in the Project Area, are believed to prefer slow-moving, open water wetlands with vegetated banks and a benthic zone of soft soil. Upland areas with little to no canopy cover are also sought after as the turtles can bask and absorb thermal energy from the vantage point of fallen logs or rocks. A select number of delineated wetlands and waterbodies within the Project Area were deemed habitable for turtles.

An amphibian's lifecycle is very reliant on water. As such, amphibian habitat preferences are assumed to incorporate wetland and waterbody features and also any adjacent upland areas. Many of the wetlands and waterbodies delineated within the Project Area provide good habitat for the listed amphibian species. Wetlands which were forested and/or associated with forested upland areas within the Project Area were noted as having less disturbances. Reduced disturbance levels in habitats tend to be beneficial to most amphibian species as many are very vulnerable to dramatic fluctuations in homeostasis and are known to be good indicators of environmental stress (Blaustein, 1994; Blaustein and Bancroft, 2007). Wetland and waterbody areas which were not encompassed by forest tended to be surrounded by active agriculture lands or were areas which were cleared and mowed periodically. Assumed cyclic plowing, clearing, and mowing disturbances are believed to moderate the presence of amphibians in these areas. Also, in some instances delineated wetlands on-site contained characteristics representative of vernal pools. These wetlands were noted to provide increased habitat preference to some of the listed amphibians due to a vernal pool's capability to provide safe breeding areas with reduced predatory pressure.

A complete list of amphibian and reptile species which were observed or presumed to occur within the Project Area is located in the master wildlife inventory list attached in Appendix 22-4.

(6) Bird, Mammal, Amphibian, Terrestrial Invertebrates, and Reptile Inventory

Mammals

Access to common mammal species ranges in the Northeastern United States is under-developed and not readily available to the public. However, observations of mammals were documented during the various on-site field studies conducted as part of this Application. Field observations encompassed the visual siting of specific species and also discovery of signs of presence, including tracks, scat, and general habitat manipulation. Documentation and evaluation of available habitat for local mammals were also noted. Mammalian species known and presumed to occur within the Project Area based off of observation of individuals and sign include:

- White-tailed deer (*Odocoileus virginianus*)
- Eastern gray squirrel (*Sciurus carolinensis*)
- Eastern cottontail (*Sylvilagus floridanus*)
- North American beaver (*Castor canadensis*)
- American red squirrel (*Tamiasciurus hudsonicus*)
- Red fox (*Vulpes vulpes*)
- Eastern chipmunk (*Tamias striatus*)
- Eastern Coyote (*Canis latrans*)
- North American porcupine (*Erethizon dorsatum*)
- Groundhog (*Marmota monax*)
- American mink (*Neovision vision*)
- Eastern raccoon (*Procyon lotor lotor*)
- American black bear (*Ursus americanus*)
- Fisher (*Martes pennanti*)

Additional mammals presumed to occur within the Project Area based off of habitat suitability include:

- Gray fox (*Urocyon cinereoargenteus*)
- Bobcat (*Lynx rufus*)
- Long-tailed weasel (*Mustela frenata*)
- Virginia opossum (*Didelphis virginiana*)
- Muskrat (*Ondatra zibethicus*)
- Striped skunk (*Mephitis mephitis*)
- Fox squirrel (*Sciurus niger*)
- Northern flying squirrel (*Glaucomys sabrinus*)
- Southern flying squirrel (*Glaucomys volans*)
- Various mice (*Mus* spp.)
- Various shrews (*Blarnia* spp., *Cryptotis* spp., *Sorex* spp.)
- Various moles (*Condylura* spp., *Scalopus* spp., *Parascalops* spp.)

A complete list of mammal species which were observed or presumed to occur within the Project Area is located in the master wildlife inventory list attached in Appendix 22-4.

Bat Surveys

Preconstruction monitoring survey of bat species were conducted by Stantec Incorporated (Stantec). Survey design was conducted in accordance with the *NYSDEC Guidelines for Conducting Bird and Bat Studies at Commercial Wind Energy Projects* (NYSDEC, 2016, USFWS 2017 *Range-wide Indiana Bat Summer Survey Guidelines* (2017 Bat Guidelines; USFWS 2017) and *USFWS Land-Based Wind Energy Guidelines* (USFWS, 2012). Survey operation was undergone in coordination with the USFWS and the NYSDEC. Field efforts were conducted as described in the work plans for bat surveys. Work plans were developed and updated as per discussions among Eight Point Wind, Stantec, TRC, NYSDEC, USFWS, and the New York State Department of Public Service (NYSDPS) following their respective reviews of the established work plans.

Studies were conducted in 2016 and 2017. Final reports of all pre-construction bat surveys have been provided to the USFWS and NYSDEC. Results of the pre-construction bat survey work are provided in detail below, and the aforementioned reports can be reviewed in Appendices 22-5 and 22-7 of this Application.

Rare Bat Acoustic Survey

The rare bat acoustic survey was based on the Standard Pre Construction Studies detailed in the NYSDEC 2016 Guidelines and the 2016 Bat Guidelines. This survey is based on state and federal survey guidelines that are geared toward addressing rare species, but the survey methodology also allows for assessment across common species. The survey design was also developed based on feedback from the USFWS and NYSDEC during a meeting on June 29, 2016 with Eight Point Wind, TRC, and Stantec, along with subsequent communications with USFWS.

Stantec deployed 43 detectors during a total of 86 detector nights. Biologists deploying and operating the detectors were experienced in conducting acoustic surveys as per the 2016 Bat Guidelines and had a general knowledge of bat ecology. Personnel responsible for deploying and operating detectors in the field were noted on each datasheet. Stantec assessed each of the 43 detector locations during deployment and selected final detector locations when observing actual on-the-ground conditions while following the criteria in the 2016 Bat Guidelines. Biologists recorded coordinates of the final detector locations using GPS, documented the approximate accuracy of the GPS unit, and photographed each detector with an object to provide scale (e.g., vehicle or person) along with the surrounding habitat to illustrate the “detector-view." For each detector site, the biologists recorded relevant deployment and habitat information on a Stantec field datasheet and 2016 Bat Guidelines Phase 1 Summer Habitat Assessment datasheet. See Appendix 22-5 for details.

Stantec used full-spectrum (Wildlife Acoustics© SM4) acoustic bat detectors for the survey. Each detector was fitted with a SMM-U1 ultrasonic omnidirectional microphone. Detectors were positioned as described in the 2016 Bat Guidelines, with detectors located in potential flight corridors that could provide suitable northern long-eared bat foraging habitat. Microphones were positioned in areas

without vegetation or with minimal vegetation within 10 meters (33 feet), and other obstructions were located at least 3 meters (10 feet) away from microphones in any direction. Detectors were placed at least 200 meters (656 feet) apart. Each detector mount positioned the microphone approximately 3 meters above ground level and oriented horizontally to the ground to sample an optimal volume of air space, as per the 2016 Bat Guidelines. Stantec used the default audio and data storage settings on each detector as recommended by the manufacturer (e.g., detectors will operate in "triggered.wav" mode using default trigger threshold settings). Each detector recorded from 30 minutes before sunset until 30 minutes after sunrise.

The acoustic bat survey occurred nights from July 30 through August 13, 2016 when weather conditions met the sample criteria. Detectors operated successfully for two (2) nights at each site, yielding 86 detector nights at the Project. Stantec retained and analyzed the data from the first two (2) nights of data collection that met the weather criteria. Data was analyzed using two automated acoustic software programs, as required by the 2016 NYSDEC Guidelines. These programs were Kaleidoscope Pro Software version 3.1.7 (classifier version 3.1.0; Kaleidoscope) and Bat Call Identification (BCID) Software version 2.7d, both of which have been approved by the USFWS as suitable for analyzing full-spectrum bat data. Presence or probable absence of species were based on the maximum likelihood estimates (MLE) generated by Kaleidoscope and BCID for each night. An MLE of less than 0.05 indicates probable presence and an MLE greater than 0.05 indicates probable absence.

One or both automated bat analysis programs indicated probable presence for recognized northeastern bat species, including the eastern small-footed myotis (*Myotis leibii*), little brown bat (*Myotis lucifugus*), silver-haired bat (*Lasionycteris noctivagans*), eastern red bat (*Lasiurus borealis*), hoary bat (*Lasiurus cinereus*), and the tri-colored bat (*Perimyotis subflavus*). In terms of rare species, the analysis programs also indicated the presence of northern long-eared bats at 25 (58%) of the 43 sites sampled. Additionally, one or both programs indicated the probable presence of Indiana bats at 22 (51%) of the 43 sites, and probable presence for both species at 15 (35%) of the 43 sites. Probable presence was indicated by one or both automated bat analysis programs for both northern long-eared bats and Indiana bats at the Project. Visual vetting of call files from those sites indicate that the presence of these species is plausible at some of the sampling sites along the southern portion of the Project.

There are recognized inaccuracies associated with automated bat identification based on acoustic data due to a combination of inadequacy of existing call libraries at representing the full suite of echolocation behavior exhibited by bats and considerable overlap in echolocation call parameters among species in the Myotis genus. This is particularly true for little brown bats (*Myotis lucifugus*) and Indiana bats. Acoustic analysis does not necessarily provide definitive species identification or species presence, in part, due to similarities across species calls, natural call variability; this is reflected in disagreement in species identifications assigned by the two programs used in this study.

The known range of the federally and state endangered Indiana bat does not overlap with the Project area, and Indiana bat is not known to occur in Steuben County (R. Niver, USFWS, personal communication); however, automated analysis of bat acoustic data indicated the potential calls of Indiana bat at the Project in 2016 and 2017. Visual review of the files could not refute the possible presence of Indiana bat based on the overlap in call characteristics that this species shares with little brown bat (*Myotis lucifugus*). However, no Indiana bat were captured during mist netting and the lack of

captures despite acoustic detections near netting locations in 2017 and overlap of *Myotis* species calls raises questions about the accuracy of the automated acoustic analysis. Therefore, the presence of federally or state endangered bat species was not confirmed in the Project Area. As such, Indiana bats were not included in further analysis.

For a more detailed description of the rare acoustic bat survey please refer to the appended *2016 Pre-Construction Avian and Bat Surveys* report produced by Stantec and located in Appendix 22-5.

Birds

In order to determine the bird species present within the Project Area, a compilation of on-site observations, surveys, and inquiries into existing data sources were compiled to create a complete list of bird species which utilize portions of the Project Area. Sources of publically available information are listed below along with general discussions of the databases queried.

USGS Breeding Bird Survey

The U.S. Geologic Survey (USGS) North American Breeding Bird Survey (BBS) is conducted by the Patuxent Wildlife Research Center of the USGS. This survey is an international avian monitoring program that is designed to track the status and trends of North American bird populations over a large scale and long time frame. Each survey route is approximately 24.5 miles long. During the survey, 3-minute point counts are conducted at 0.5-mile intervals. During the point counts, every bird seen or heard within a 0.25-mile radius is recorded (Pardieck, Ziolkowski, and Hudson, 2015).

The Swain survey route is approximately 8.0 miles northwest of the Project Area and encompasses similar ecological communities present on-site. This survey route occurs through the Appalachian Mountains bird conservation region and has been utilized since 2011 with survey windows occurring between May 27 and July 7. A total of 84 species have been documented during the lifetime of this survey route. Most birds documented have been common species found within the forests, forest edge, shrublands, old-fields, and wetlands throughout New York State. The most common species documented in this survey route are:

- American crow (*Corvus brachyrhynchos*)
- American robin (*Turdus migratorius*)
- Barn swallow (*Hirundo rustica*)
- Black-capped chickadee (*Poecile atricapillus*)
- Blue jay (*Cyanocitta cristata*)
- Cedar waxwing (*Bombycilla cedrorum*)
- Common yellowthroat (*Geothlypis trichas*)
- European starling (*Sturnus vulgaris*)
- Gray catbird (*Dumetella carolinensis*)
- Mourning dove (*Zenaida macroura*)
- Ovenbird (*Seiurus aurocapilla*)
- Red-winged blackbird (*Agelaius phoeniceus*)
- Song sparrow (*Melospiza melodia*)
- Tree swallow (*Tachycineta bicolor*)

New York State Breeding Bird Atlas

The New York State Breeding Bird Atlas (BBA) statewide survey resource was used to identify any bird species which breed within the Project Area. Survey point counts are conducted by volunteers in a 5 square kilometer survey block across New York State (McGowan and Corwin, 2008). The Project Area is located within a total of 9 New York State BBA blocks. A BBA dataset provided a detailed distribution of bird species located within these specific survey blocks inside the Project Area. A total of 109 species were observed to occur within the aforementioned survey blocks (See Appendix 22-4 for a complete list of species). Many common avian species were documented through multiple data sets, however species documented solely from the BBA included the following:

- American woodcock (*Scolopax minor*)
- Bank swallow (*Riparia riparia*)
- Belted kingfisher (*Megaceryle alcyon*)
- Chimney swift (*Chaetura pelagica*)
- Hooded merganser (*Lophodytes cucullatus*)
- Horned lark (*Eremophila alpestris*)
- Lawrence's warbler (*Vermivora cyanoptera x chrysoptera*)
- Vesper sparrow (Pooecetes gramineus)
- Yellow-billed cuckoo (*Coccyzus americanus*)
- Yellow-throated vireo (*Vireo flavifrons*)

Audubon Christmas Bird Count

In order to gain understanding on year-round and wintering avian inhabitants of the Project Area, data from the Audubon Christmas Bird Count (CBC) was obtained. The CBC provides a summary of avian species which inhabit regions during the early winter months. The primary objective of the CBC is to monitor the status and distribution of wintering bird populations in the Western Hemisphere. Counts occur in a single day during a three-week period around Christmas. A 15-mile diameter search area is created in a locale area and all bird species and individuals observed in this predetermined search area are documented. The closest predetermined CBC zone is the *Scio* search area (Audubon Count Code: NYSO). This search area is approximately 12 miles due west from the Project Area. Within the Scio search area, on December 17, 2016, a total of 35 different types of avian species were reported. Most species were also reported in the BBA and the BBS. However several unique species identified in the CBC are American tree sparrow (*Spizella arborea*), common redpoll (*Acanthis flammea*), herring gull (*Larus argentatus*), and the ring-billed gull (*Larus delawarensis*) (National Audubon Society, 2016).

A complete list of avian species which were observed or presumed to occur within the Project Area is located in the master wildlife inventory list attached in Appendix 22-4.

Avian Field Surveys

Preconstruction monitoring survey of avian species were conducted by Stantec. Survey design was conducted in accordance with the *NYSDEC Guidelines for Conducting Bird and Bat Studies at Commercial Wind Energy Projects* (NYSDEC, 2016 and *USFWS Land-Based Wind Energy Guidelines* (USFWS, 2012). Survey operation was undergone in coordination with the USFWS and NYSDEC. Work Plans were

developed and updated as per discussions among Eight Point Wind, TRC, NYSDEC, USFWS, and NYSDPS following their respective reviews of the Work Plans.

Studies were conducted in 2016 and 2017. Final reports of all pre-construction avian surveys were provided to the USFWS and NYSDEC upon their completion during the fall of 2017. Results of the pre-construction avian survey work is provided in detail below.

Aerial Bald Eagle Nest Survey

Stantec conducted a pre-construction aerial bald eagle (*Haliaeetus leucocephalus*) nest survey at the Project. Stantec conducted the survey based on USFWS Eagle Conservation Plan (ECP) Guidance (USFWS, 2013) and the proposed Project area as of June 1, 2016; and Email correspondence between Stantec and Brianna Gary, Avian Ecologist of NYSDEC, in February and May 2016, which resulted in the mapping of known bald eagle nest locations and the recommendation of a flight at the Project.

The objective of the bald eagle aerial nest survey was to document locations of bald eagle nests within 10 miles of the Project. Prior to conducting the survey, Stantec reviewed information provided by the NYSDEC and the State of Pennsylvania regarding known active and historic bald eagle nest locations in the vicinity of the Project, as well as observations from biologists during site visits.

The aerial bald eagle nest survey was conducted on June 1-2, 2016 with a Cessna fixed-wing aircraft. The aerial survey was separated into two areas where two different methods were used. Within five miles of the proposed turbines, surveys were conducted along 22 transects spaced at one mile wide and oriented north-to-south over the Project Area. Between five and 10 miles (8–16 km) from the proposed turbine locations, suitable bald eagle nesting habitat was surveyed (e.g., large forested streams, lakes, large ponds and wetlands, and reservoirs) using meandering flight paths. The survey consisted of low altitude passes, where topography allowed, at an altitude of approximately 500 to 750 feet above ground level. During the flight, two Stantec biologists with experience conducting aerial bald eagle nest surveys scanned for bald eagles and potential nest structures from both sides of the plane.

The NYSDEC had records of two known bald eagle nests within 10 miles of proposed turbine locations (as of June 1, 2016); one located in Whitesville along Cryder Creek and one located in Cameron along the Canisteo River. The State of Pennsylvania had no historical records of bald eagle nests within 10 miles of the proposed turbines; however, they indicated the location of one historic nest located to the southeast of the current boundary in Pennsylvania. Stantec observed an active bald eagle nest within the Project Area located along Bennetts Creek north of the Hamlet of Greenwood during other on-site pre-construction field surveys.

In addition to sampling the transects and suitable habitats within 10 miles of turbine locations, Stantec surveyed the two historic and one new nest locations within 10 miles of the Project Area (the historic nest in Pennsylvania and historic nest in New York outside of 10 miles were not surveyed). It was confirmed that the nest on Cryder Creek in Whitesville and the nest on Bennetts Creek in Greenwood were both occupied by bald eagles. Each nest contained two successfully hatched eaglets at the time of the survey. The historic nest site on the Canisteo River in Cameron was not located. No other bald eagle nests were observed in the Project Area, and no incidental observations of bald eagles were made in the survey area.

Following completion of the 2016 bald eagle nest survey, Eight Point Wind reduced the Project Area such that occupied bald eagle nests are not included within the Project boundary. The nearest occupied bald eagle nest, as observed during the 2016 bald eagle nest survey, is the Bennetts Creek nest located approximately 1.5 miles from the Project Area.

For a more detailed description of the aerial bald eagle survey please refer to the appended *2016 Pre-Construction Avian and Bat Surveys* report located in Appendix 22-5.

Eagle and Raptor Point Count Survey

Point counts were used to assess activity during baseline conditions at the Project for bald eagles, golden eagles (*Aquila chrysaetos*), and other raptor species occurring in the eastern United States. The survey was designed to investigate the distribution, relative abundance, behavior, and site use by raptors during migratory, breeding, and wintering period.

Methods were based on a combination of both USFWS ECP Guidance and the NYSDEC Guidelines. Consistent with the ECP Guidance, the survey took place year-round. In keeping with the NYSDEC Guidelines, Stantec conducted weekly visits to a subset of points during the spring and fall migratory periods when bald and golden eagles and raptors are known to migrate through the region. Monthly visits to all plots were conducted during the winter and summer. Spring and fall migration point counts were conducted from March 2 – June 21, 2016 and August 21 – November 29, 2016, and monthly summer and winter point counts were conducted from July 12 – August 24, 2016 and December 13, 2016 – March 1, 2017.

Eagle and raptor point counts were conducted at 14 points within the Project Area. Per the ECP Guidance, the number of point count locations was determined by calculating the turbine area including a 1-km buffer around turbines, calculating 30% of the area, and dividing by two to derive the number of 2 km^2 plots. Each plot consists of an 800-m radius (2 km^2). Plots were distributed throughout the Project Area at locations with suitable viewsheds of the sky and in locations where landowner permission had been granted. Point count locations were mapped using a Global Positioning Systems (GPS). Qualified biologists familiar with raptor species that occur in the region conducted the surveys.

During spring and fall migratory periods, point counts occurred between 8 am and 2 hours before sunset and each point count was 2-hours long. Point counts conducted prior to June 1 occurred between 9 am and 4 pm consistent with the original Work Plan, dated March 8, 2016, which predates the June 2016 NYSDEC Guidelines. The number of survey points sampled and the number of survey hours per week during the migratory periods were based on a sliding scale based on the local sunset calendar with a minimum of seven survey hours per week to meet the level of effort described in the NYSDEC Guidelines. All 14 points were sampled at least once per month. The starting plot changed each survey visit to enable sampling of each plot during a range of daylight hours.

During the summer and winter periods, point counts occurred between 9 am and 4 pm and each point count was 1-hour long. All 14 points were surveyed once per month during the summer and winter periods.

The survey targeted bald and golden eagles, but all raptors observed were recorded. In addition, Stantec recorded incidental observations of other species (e.g., waterbirds and songbirds) during point counts. During point counts, observers recorded the horizontal distance of each eagle from the observer and the duration of observation of each eagle flying within plots — recorded as the duration of the observation within 800 meters and flight height equal to or less than 200 meters (the hazard zone), per the ECP Guidance. In addition, observers recorded each eagle's flight path on a map of the 800-meter radius plot. Each eagle observation included the bird's behavior and activity (prevalent behavior during each 1-minute interval of observation), age class, and weather conditions during the observation (i.e., wind direction and speed, cloud cover, precipitation, and temperature).

Other raptor observations were recorded on separate datasheets. Biologists recorded the species, number of individuals, location, flight height, and behavior for other species of raptors observed.

Between March 2, 2016 and March 1, 2017, Stantec conducted 34 visits completing 277 hours of eagle and raptor point counts. Each of the 14 survey points was visited between 11 and 14 times, resulting in a total of 175 point counts. Weather conditions ranged from clear to overcast, with periods of drizzle on March 15, 2016 and March 1, 2017, periods of rain on August 31 and November 29, 2016, and periods of snow on December 14-15, 2016. Stantec recorded 176 total eagle minutes and 96 exposure-minutes in the approximate rotor-swept zone of the turbines (i.e., within the 800-meter plots and below 200 meters). The total eagle passage rate (eagle minutes per minute of survey) was 0.0347. The eagle passage rate for eagle minutes observed in the survey areas and in the approximate rotor-swept zone was 0.0209. Stantec recorded 85 eagle observations during point counts: 78 bald eagles, three (3) golden eagles, and four (4) eagles that could not be identified to species (due to the distance of the bird from the observer, poor lighting, or short duration of the observation). Stantec also observed 13 species of raptors during eagle and raptor point counts. The most commonly observed raptor species was turkey vulture (*Cathartes aura*) (n = 327, 58%), followed by red-tailed hawk (*Buteo jamaicensis*) (n = 168, 30%). Likewise, both turkey vulture and red-tailed hawk were observed at all 14 point-count locations.

There were no federally endangered or threatened species observed. There was one state endangered species observed, golden eagle, and two state threatened species, bald eagle and northern harrier. There were five state special concern species observed: Cooper's hawk, northern goshawk, sharp-shinned hawk, osprey, and red-shouldered hawk. Most eagle and raptor observations occurred during the fall migration (September – October) or spring migration (March – April) periods, with turkey vultures and red-tailed hawks accounting for most observations overall. In general, the species observed are common migrants to the region and several of these species commonly breed in the region as well.

For a more detailed description of the Eagle and Raptor Point Count Survey including a list of raptors encountered, please refer to the appended *2016 Pre-Construction Avian and Bat Surveys* report located in Appendix 22-5.

Breeding Bird Survey

Stantec conducted a breeding bird survey (BBS) in 2016 at the Project to assess baseline use of the Project area by breeding birds. The general location of each survey transect was determined using aerial

imagery of the Project and plotted with a GPS. The final location of each transect was confirmed during the first visit to each transect and recorded with GPS.

Stantec conducted the BBS point counts at the Project weekly between May 17 and July 14, 2016 (9 weeks) consistent with proposed survey methodology discussed during interagency teleconferences on February 11 and April 6, 2016 and changes to that methodology based on Project layout updates discussed on the June 29, 2016 teleconference. Qualified biologists familiar with New York state birds by sight and sound walked transects between sunrise and 10 am. The survey visits occurred on those days when weather conditions were conducive to auditory and visual detection and identification of birds (excessively windy, rainy, foggy, or cold days were not surveyed). The point counts focused on songbirds and included observations of active nests and recently fledged young. Biologists also recorded observations of soaring raptors, waterfowl, and flyovers of all species. Stantec also noted any disruption and/or distraction that occurred during a survey period that may have precluded an appropriate survey. Stantec sampled 14 300-m transects. Stantec surveyed each transect four times, once each during mid- to late-May, early to mid-June, mid- to late-June, and early to mid-July. There were seven point-count locations along each transect positioned at 50-meter intervals. The biologists conducted 10-minute point counts and recorded all avian species heard and seen after a 1- to 2-minute pause to offset potential disruption to bird behavior while travelling to each point.

Biologists detected 4,863 individuals representing 87 species at the 98 point-count locations. Excluding flyovers, Stantec observed 1,192 birds within 50 m of the points. Forested habitat had the most points (n = 30) and the most individuals observed (n = 286) among turbine points, and the most points (n = 24) and the most individuals observed (n = 323) among control points. Forested habitat also had the greatest species richness (SR = 40) and the highest diversity index (SDI = 2.96) among turbine points, and the greatest species richness (SR = 48) and the highest diversity index (SDI = 3.30) among control points. Field habitat had the greatest average relative abundances among turbine (RA = 3.70) and control points (RA = 4.35).

Point count surveys are a common method used to assess the species composition of breeding birds that sing diurnally, and data collected can be used to estimate relative abundance among species detected and characterize bird communities by habitat. The point count data collected in 2016 provides baseline information about the breeding bird communities in the habitats of the Project Area.

The 2016 breeding bird point counts occurred in suitable weather conditions for detecting birds during the peak breeding period in New York. The survey was based on standard USGS methods for point counts conducted in habitats that are characteristic of the Project Area. The layout of the point count locations targeted those areas that may be affected by the Project, as well as at control areas located at least 800 m away from proposed turbine locations.

Species detected during this Breeding Bird Survey are generally common, regionally abundant, and are representative of the habitats in which they were observed.

Fall Migrating Bird Survey

The purpose of the fall migrating bird survey was to document the occurrence of migrating species through the Project Area, including species that might not normally be documented using a more traditional method, such as raptor and eagle point count or summer breeding bird survey.

Stantec conducted weekly visits between August 23 and October 26, 2016 (10 weeks). A qualified biologist, familiar with the birds of New York by sight and sound, walked transects between early morning and approximately 2 pm on days when weather conditions were conducive to auditory and visual detection and identification of birds (i.e., transects were not surveyed on excessively windy, rainy, foggy, or cold days). Stantec noted any disruption and/or distraction (e.g., tree-cutting, mowing, vehicle noise) that occurred during a visit that may have affected the detection of birds.

Stantec sampled 14 300-m transects. Fall migrating bird transects were the same as those used during the BBS with two adjustments to account for the Project layout as of August 2, 2016. There were seven point counts per transect located at 50-m intervals. The 50-m interval spacing potentially increased the chance for double-counting individuals at adjacent points, so the biologists noted if individual observations at adjacent points were suspected to be the same individual previously recorded. Biologists conducted 10-minute point counts and recorded all avian species heard and seen after a 1- to 2-minute pause to offset potential disruption to bird behavior while traveling between points. During each visit, Stantec sampled 3–4 different transects each week in September and October and 5–6 different transects each week in August because the survey started the week of August 22, such that each transect was sampled approximately three times during the fall migration period.

Survey points along transects were sited in forested and non-forested habitats within the Project Area and transmission line, as currently proposed, where landowner permission had been granted. The Project Area is 54% forested and 46% non-forested. Approximately 60% of survey points were in forested habitats, and 40% of points were in non-forested habitats.

Biologists detected 2,421 individuals representing 60 species at the 98 point count locations. Excluding flyovers, Stantec observed 459 birds within 50 m of the points. Forested habitat had the most points (n = 35), most individuals observed (n = 188), and greatest species richness (SR = 18) among turbine points, and most points (n = 24), most individuals observed (n = 140), and greatest species richness (SR = 29) among control points. Forest edge habitat had the highest diversity index (SDI = 2.61) among turbine points, and forested habitat had the highest diversity index (SDI = 2.59) among control points. Field habitat had the highest average relative abundance (RA = 11.11) among turbine points, and forest edge habitat has the highest average relative abundance (RA = 16.67) among control points.

A complete list of avian species which were observed or presumed to occur with the Project Area is located in the master wildlife inventory list attached in Appendix 22-4. More specifically, for a more detailed description of the on-site avian surveys conducted including a list of avian species encountered in the survey work, please refer to the appended *2016 Pre-Construction Avian and Bat Surveys* report located in Appendix 22-5.

Freshwater Fish

A formal request to the NYSDEC Division of Fish, Wildlife & Marine Resources requesting information pertaining to freshwater fish species documented in waterbodies within the Project Area was sent on March 21, 2017. Streams which are encompassed in the Project Area and incorporated into the information request include, Cryder (Marsh) Creek, Purdy Creek, Wileyville Creek, the upper and lower portions of Bennett Creek, the middle portions of Canisteo River, the upper portions of Dyke Creek, and the lower portions of Troups Creek. Minor tributaries associated with the aforementioned waterbodies and also some tributaries which flow into neighboring Pennsylvania watersheds within the Project Area were also included in the database query.

Due to the high elevation areas required by turbine sites to generate sufficient wind for the viability of the Project, most of the Project Area resides in the highest regions of the surrounding watersheds. As such, most streams within the Project Area are narrower, steeper in grade, and have marginal depths. Waterbodies which contain sufficient depths and other habitat characteristics to support fish species are located at the bases of these hilltops and in the river valleys bisecting the Project Area. In these areas, linear Project features, including access roads, overhead transmission lines, and underground collection lines traverse stream features. Project layout was designed through an iterative process of identifying wetland locations and siting Project components to avoid and minimize impacts to surface waters and wetlands in support of Federal and State laws. The use of Horizontal Directional Drilling (HDD) in select locations and culverts along encountered streams will be utilized in order to mitigate adverse impacts to fish and other aquatic populations within the Project Area.

In an effort to conservatively report on the potential impacts to local wildlife as a result of the Project, all fish species listed within the NYSDEC Statewide Fisheries Database which are related to the aforementioned waterbodies were included in the master wildlife inventory list attached in Appendix 22-4. A total of 31 fish species were identified as a result of the inquiry which was received on March 30th, 2017. Larger, and recreationally significant fish located within the Project Area include brook trout (*Salvelinus fontinalis*), brown bullhead, brown trout (*Salmo trutta*), largemouth bass (*Micropterus salmoides*), pumpkinseed (*Lepomis gibbosus*), rock bass (*Ambloplites rupestris*), and smallmouth bass (*Micropterus dolomieu*). Smaller fish species are far more inconspicuous, however they play important roles in the aquatic ecologies of inhabited waterbodies. These smaller fish are also known to inhabit the above-mentioned streams as well, and include species such as banded darter (*Etheostoma zonale*), bluntnose minnow (*Pimephales notatus*), common shiner (*Luxilus cornutus*), creek chub (*Semotilus atromaculatus*), Eastern blacknose dace (*Rhinichthys atratulus*), fantail darter (*Etheostoma flabellare*), johnny darter (*Etheostoma nigrum*), spottail shiner (*Notropis hudsonius*), tessellated darter (*Etheostoma olmstedi*), and the white sucker (*Catostomus commersonii*).

A complete list of freshwater fish species which were observed or presumed to occur with the Project Area is located in the master wildlife inventory list attached in Appendix 22-4.

Terrestrial Invertebrates

The Project Area encompasses a large area and covers a wide and variable degree of habitat types. As such, a vast multitude of terrestrial invertebrates are likely to utilize habitats within the Project Area.

Terrestrial invertebrates are a diverse group of animals residing on dry land that neither possess nor develop a backbone. These include a variety of arthropods, including insects (e.g., beetles, bugs, ants, bees, butterflies, moths, cockroaches, mantis, stick insects, dragonflies, mosquitoes, fleas, crickets, grasshoppers, fireflies, cicadas, and flies), arachnids (e.g., various spider species, ticks, and mites), and myriapods (e.g., millipedes and centipedes) amongst many others. Worms are also another form of terrestrial invertebrate, which typically have a long cylindrical tube-like body and no limbs. Terrestrial species include earthworms and nematodes, which are very common invertebrates that live in the top soil. Mollusks are another vast group of invertebrates. Of this immense group, a portion of mollusks are terrestrial and include snails and slugs. Invertebrates are often the keystone components to the health of habitats and ecosystems and support more familiar vertebrate species. Most of the terrestrial invertebrates' importance is due to the variety of services and functions this animal group provides. Some important services include pollination, decomposition, nutrient cycling, and the promotion of soil fertility for plant growth. Terrestrial invertebrates are also a vital food source for many larger species within ecosystems due to their population abundance.

A complete list of terrestrial invertebrate species which were observed or presumed to occur with the Project Area is located in the master wildlife inventory list (Appendix 22-4).

Wildlife Habitat

As stated previously, there are multiple ecological communities which occur within the Project Area (see Section 22.1). The associated wildlife habitat that each general ecological community type provides is discussed in detail below with references to some notable above-mentioned species present within each habitat.

Forestland

Forestland within the Project Area provides suitable habitat for forest specialist species. Forests contain many characteristics and components which can be utilized to the benefit of individual organisms. Some features include decreased anthropomorphic disturbance levels, low light levels, protected nesting sites, increased shelter structure, dry shelter sites, concealment/camouflage, variable food sources, even moisture levels, and many other characteristics. Mammals which are believed to utilize forest communities within the Project Area are white-tailed deer, eastern gray squirrel, eastern cottontail, American red squirrel, red fox, eastern chipmunk, coyote, North American porcupine, American mink, eastern raccoon, American black bear, fisher, gray fox, bobcat, long-tailed weasel, Virginia opossum, striped skunk, fox squirrel, northern/southern flying squirrel; and various mice, shrew, and moles. Reptiles and amphibians believed to populate forest communities within the Project Area include Eastern American toad, wood frog, gray tree frog, northern spring peeper, pickerel frog, northern redbelly snake, smooth green snake, eastern milk snake, northern ringneck snake, spotted salamander, red-spotted newt, Allegheny mountain dusky salamander, northern redback salamander, northern slimy salamander, Wehrle's salamander, northern spring salamander, and Northern two-lined salamander. Bird species specific to the forest interior identified by Stantec during field surveys include American redstart (*Setophaga ruticilla*), black-and-white warbler (*Mniotilta varia*), black-throated blue warbler (*Setophaga caerulescens*), black-throated green warbler (*Setophaga virens*), blue jay, brown creeper *Certhia americana*), common raven (*Corvus corax*), hooded warbler (*Setophaga citrina*), ovenbird, red-

eyed vireo (*Vireo olivaceus*), scarlet tanager (*Piranga olivacea*), veery (*Catharus fuscescens*), and wood thrush (*Hylocichla mustelina*).

Successional Shrubland

Successional shrublands are highly dynamic habitats as the impacted area progresses in successional (seral) stages after a disturbance. The variability present in these environments creates valuable wildlife habitat due to the influx of different wildlife species which are adapted to the different plants which grow during the different seral stages (NRCS, 2007). In many early successional communities, annual plants produce an abundance of seeds which are consumed by granivorous birds and small mammals. A variable assortment of plant species provide highly nutritious forage material for herbivore and browser species. Additionally, the low and oftentimes dense herbaceous and shrub vegetation provides cover for birds and small mammals that prefer open habitats but are heavily preyed upon. A lack of a closed canopy also allows light and heat to penetrate to the ground and is an essential habitat feature for reptiles that depend on heat sources outside their body for temperature regulation. Reptiles and amphibians believed to populate successional shrubland communities within the Project Area include spotted salamander, Northern dusky salamander, Northern two-lined salamander, Eastern American toad, Northern spring peeper, wood frog, shorthead garter snake, common garter snake, northern redbelly snake, smooth green snake, Eastern milk snake, and Northern ringneck snake. Mammals that are believed to utilize successional shrubland communities within the Project Area are white-tailed deer, eastern gray squirrel, eastern cottontail, American red squirrel, red fox, eastern chipmunk, coyote, groundhog, eastern raccoon, American black bear, gray fox, bobcat, long-tailed weasel, Virginia opossum, striped skunk; and various mice, shrew, and moles. Bird species specific to successional shrubland identified by Stantec during field surveys included brown thrasher (*Toxostoma rufum*), willow flycatcher (*Empidonax traillii*), gray catbird, dark-eyed junco (*Junco hyemalis*), American goldfinch (*Spinus tristis*), common yellowthroat , yellow-breasted chat (*Icteria virens*), and golden-winged warbler (*Vermivora chrysoptera*).

Successional Old-field

The open grassland habitats of successional old-fields contain a vast array of grasses, sedges, and rush species amongst many other herbaceous plant species. These diverse open areas provide habitat for many species which prefer open grassland settings. As with successional shrublands, the variable assortment of plant species provide highly nutritious forage material for herbivore and browser species. Old field habitats typically have a high diversity and abundance of flowering forbs, which provide food for pollinators such as bees and butterflies. Due to the open expanses, large predators are oftentimes very visible and so predation tends to be reduced in these habitats to the benefit of small grassland species. Mammals which are believed to utilize grassland communities within the Project Area are white-tailed deer, eastern cottontail, red fox, coyote, gray fox, bobcat, groundhog, long-tailed weasel, striped skunk; and various mice, shrew, and moles. Reptiles and amphibians believed to populate successional old-field communities within the Project Area include Eastern American toad, Northern spring peeper, shorthead garter snake, common garter snake, northern redbelly snake, smooth green snake, Eastern milk snake, and Northern ringneck snake. Bird species specific to successional old-field identified by Stantec during field surveys include the bobolink (*Dolichonyx oryzivorus*), eastern meadowlark (*Sturnella magna*), savannah sparrow (*Passerculus sandwichensis*), red-winged blackbird,

eastern kingbird (*Tyrannus tyrannus*), and eastern bluebird (*Sialia sialis*). Old field communities in the Facility Site also provide habitat for the state-threatened Henslow's sparrow (*Ammodramus henslowii*). Raptors such as the Red-tailed hawk (*Buteo jamaicensis*) and Northern Harrier (*Circus cyaneus*) use successional old-field habitats for aerially hunting prey due to the minor canopy cover.

Open Water

The open water habitats of lakes, ponds, or wetlands support a diverse amount of semi-aquatic and aquatic species. Open water habitats are very important to surrounding communities as they are a site for increased nutrient production, waste and debris decomposition, high in biodiversity, and provide water supply to terrestrial species (Keddy, 2010). These habitats can support populations of waterfowl, amphibians, terrestrial and aquatic invertebrates, and semi-aquatic mammals as well as provide water supply and foraging opportunities to terrestrial species. Mammals which are believed to utilize open water communities within the Project Area are the American mink, North American beaver, muskrat, Eastern raccoon, and the fisher. Reptiles and amphibians believed to populate open water communities within the Project Area include, Northern spring peeper, American bull frog, green frog, Northern leopard frog, pickerel frog, Northern water snake, common snapping turtle, and the painted turtle. These streams also provide suitable habitat for aquatic insects that act as prey items for many fish species. Other aquatic invertebrates found in these habitats include clams, mussels, and crayfish and also support species of higher trophic levels. Waterfowl and wading bird species specific to the open water communities within the Project Area include Canada goose (*Branta Canadensis*), wood duck (*Aix sponsa*), mallard (*Anas platyrhynchos*), blue-winged teal (*Anas discors*), great blue heron (*Ardea herodias*), green heron (*Butorides virescens*), belted king fisher, Louisiana waterthrush (*Parkesia motacilla*), common merganser (*Mergus mergansers*), and the hooded merganser.

Active Agriculture

Active agriculture provides marginal habitat due to the increased anthropogenic disturbance in these areas. Although agricultural areas may be too frequently disturbed for nesting and breeding, some birds use these areas for foraging and as a stop-over during migration. Additionally, various mammals may eat agricultural crops as a supplement to natural food sources.

See a description of the inventory of bird, amphibian, reptiles, and terrestrial invertebrates described in detail in the aforementioned sections of 22(d). A compiled list of all species encountered or assumed to occur within the Project Area is located in Appendix 22-4.

(7) Significant Natural Communities and Unusual Habitats

There are no significant natural communities or unusual habitats, including designated Significant Coastal Fish and Wildlife Habitat, within, or adjacent to, the intended Project. As such, impacts to these designated habitats are not proposed to occur as a result of the Project.

(8) Calcareous Shoreline Outcrops and Karst Features

There are no calcareous shoreline outcrops or karst features in the vicinity of the Project. As such, impacts to these specific geological features is not proposed to occur as a result of the Project.

22(e) Plant and Wildlife Species Inventory

This Application includes master species lists of both plant and wildlife species inventory based on existing data available from state and nation-wide publically available databases. Compounding this information were also species documented during on-site field surveys (e.g., ecological cover type assessments, habitat assessments, and wetland delineations) including availability of suitable habitat, was also utilized to identify species which could potentially occur within the Project site at some point annually. The master species lists for plants and wildlife can be found in Appendix 22-1 and 22-4 of this Application, respectively.

22(f) Vegetation, Wildlife, and Wildlife Habitat Impacts

(1) Construction Related Impacts to Vegetation, Wildlife, and Wildlife Habitat

Impacts to vegetative communities will occur as a result of construction. Approximately 477 acres of vegetation will be temporarily impacted. Concurrently, approximately 29.8 acres will be permanently lost due to the siting of Project components. Although the siting of Project components will result in the loss of plant community acreages, no specific plant community will be significantly reduced in population or completely eradicated as a result of the Project. The Applicant has taken measures to avoid, minimize, and mitigate for vegetation impacts to the maximum extent practicable.

Impacts to wildlife and their various habitats will also occur as a result of this Project. Impacts are anticipated to be restricted to incidental injury and mortality due to various construction operations, displacement due to increased human activity during construction, increased silt and sedimentation impacts to aquatic habitats and associated organisms, and habitat disturbance and/or loss (including the loss of travel corridors) as a result of clearing, earth-moving, and the siting of Project components. Each listed impact is addressed in more detail below.

Incidental Injury and Mortality

Although calculating the incidental injury and/or mortality of wildlife individuals is inherently difficult, it is understood that construction operations could generate injury or mortality to local wildlife in random occurrences. Wildlife which do not vacate their communities rapidly prior to the onset of construction disturbance will have an increased likelihood of incidental injury or mortality. As such, it is presumed that injury and mortality will be inflicted more directly onto any local sedentary species (e.g., small or young mammals, reptiles, invertebrates, and most amphibians). Species which are more mobile or more mature, have a better ability to vacate construction areas prior to the onset of disturbances.

Use of shrubland or forested communities by wildlife is concentrated in the spring and summer months. However, a majority of the shrub and tree clearing is planned to occur within the winter months (October 1-April 30). As such, operations which will be clearing in the winter months will aide in the reduction of impacts to a majority of wildlife (select mammals, birds, and invertebrates) on-site as is it outside most wildlife breeding and occupancy periods. Mortality events due to vehicular activity is also presumed to increase with increased traffic patterns resulting from construction operations within the Project Area. Upon the completion of construction, traffic is presumed to return to more standard

patterns and frequencies and so mortality events as a result of vehicular traffic is presumed to also reduce back to pre-construction levels.

Wildlife Displacement

Project construction will also cause wildlife displacement to occur in areas with increased human activity, construction disturbance, and where rises in noise level transpire. The extent of displacement will vary between species and also with the seasonal timing of construction activities. A majority of displacement impact is presumed to occur on wildlife which utilize the pre-determined impact areas for breeding, nesting, denning, or other routine use (travel corridors, foraging, communication, territorial marking, etc.). If construction begins before the initiation of breeding, nesting, denning, or other routine activities, then the associated wildlife individual is assumed to avoid the impact area and navigate through, or re-establish in, adjacent suitable and undisturbed habitat if available. If construction impact occurs while the area is in use by a wildlife individual, then the species which are accustomed to similar land clearing disturbances are expected to remain and utilize habitats in closer proximity to the construction impact area. Other species will relocate to suitable habitats or become at risk to incidental injury or mortality. Displacement impacts as a result of the Project will be relatively minor due to the presence of suitable habitat for many local wildlife species which will remain within or adjacent to the siting of Project components throughout the Project.

Siltation and Sedimentation Events

During the construction phase of the Project, earth-moving activities, including the establishment of temporary and permanent access roads, turbine foundation excavation and grading, and the trenching of underground utilities, could cause the siltation and sedimentation of wetlands and waterbodies within or adjacent to these impact areas. In addition, increased vehicular traffic and the use of heavy machinery may also distribute sediments throughout the construction area as soils could have accumulated onto vehicular equipment and been redistributed around the Project Area or disbursed aerially in the form of dust. Siltation can also occur downslope of areas subject to significant earth-moving activity (e.g., construction of access roads, turbine foundation grading, and excavation). If mitigation measures are not applied, the siltation and/or sedimentation of wetlands or waterbodies can impact water quality and any associated aquatic habitats and species. The Applicant's proposed mitigation measures are explained below. Sediments in suspension can also decrease water clarity and reduces visibility for aquatic inhabitants. Turbid waters also prevent the growth of aquatic plants and algae, which require light for photosynthesis, and also decrease the ability of fish to find food or to detect predators and prey, thereby increasing stress. Sediments and siltation may also smother stream invertebrates, such as mussels, which are an important food sources for higher trophic levels. Excessive sediment and siltation deposits on the bed of a waterbody may also alter and degrade physical habitats. Some aquatic species are dependent on rocky substrates and live in deep pools or around woody debris. The presence of excess sediments may fill the aforementioned areas that species reside in. This reduces the amount of variety of aquatic habitat and cover and can also reduce spawning grounds for fish species. An increase in the amount of sediment deposited in a waterbody may also change the flow and depth of waterbodies and wetlands.

Careful siting of the Project components has been implemented to avoid most impacts to wetlands and waterbodies in the Project Area. Best management practices will be adhered to in the construction phase of the Project, and mitigation planning efforts designed to occur post-construction will aide in making the impact to wetlands and waterbodies concentrated areas of the Project only, and minor in nature. A detailed discussion on wetland and waterbody impact avoidance and mitigation measures for the Project is included in Exhibit 23.

Habitat Disturbance and Loss

Approximately 477 acres of wildlife habitat will be temporarily impacted during construction of the project. However, only approximately 29.8 acres of wildlife habitat will be lost due to the placement of Project components. Moreover, 19.3 of the 29.8 acres of wildlife habitat permanently lost along with 299.6 of the 477 acres temporarily impacted, reside in active agricultural areas which provide limited perpetual habitat for wildlife due to the regular disturbances and anthropogenic pressures resulting from active farming practices. Specifically, it is anticipated that approximately 147.7 acres of forestland, 10 acres of successional scrubland, 19 acres of successional old-field, and 299.6 acres of active agricultural lands will be temporarily disturbed during construction. Concurrently, approximately 8.6 acres of forestland, 0.6 acres of successional scrubland, 1.3 acres of successional old-field, and 19.3 acres of active agricultural lands will be permanently lost as a result of the sighting of Project components. Note, acreages with vegetation estimated to occur in disturbed/developed areas were excluded from these calculations as wildlife habitat in these areas are presumably present but more marginal in nature where wildlife has in fact adapted to survive in a disturbed setting. Also, no direct impacts to open-water habitats are presumed to occur as a result of this Project. See Exhibit 23 for a detailed discussion on impacts to surface waters defined by on-site wetland and waterbody delineations conducted within the Project component impact areas.

To the maximum extent practicable, the Project components have been intentionally sited on the edges of existing active agricultural fields. This effort was done to reduce impacts to natural communities and also understanding the importance of avoiding impacts to crop production/harvesting in adjacent agricultural areas. Active agricultural areas provide limited habitat for wildlife due to periodic disturbances which occur in the form of clearing, mowing, plowing, and harvesting by the landowner. As such, construction of the Project in these areas will impact a reduced number of wildlife species and their appropriate habitats. In areas where the siting of Project components required placement into forestland, successional shrubland, or successional old-field; impacts occur in areas where there is an abundance of available habitat directly adjacent to the impact corridors. As such, overall impacts to the habitat requirements and use for individual wildlife species in the Project Area will be minor. Construction-related impacts will not be significant enough to adversely affect local populations of any resident or migratory wildlife species.

(2) Operation Related Impacts to Vegetation, Wildlife, and Wildlife Habitat

Operation-related impacts, or impacts which can occur to vegetation, wildlife, and wildlife habitat while the wind facility is functioning; include direct habitat loss, habitat degradation through forest fragmentation, disturbances due to wind turbine operation, and specific mortality as a result of turbine blade collisions.

Habitat Loss

A direct and permanent loss of approximately 29.8 acres of wildlife habitat will occur as a result of the Project. Total habitat loss represents 0.19% of the total 15,295 acres included in the Project Area. Of this percentage, approximately 0.06% of the loss is to forestland, 0.004% is to successional shrub lands, 0.008% is to successional old-field, and 0.13% is to active agriculture. Approximately 47 acres of forest land will also be converted into successional communities. Intrinsically, a majority of the approximate habitat loss occurs within active agriculture. As stated previously, of the plant community types present within the Project Area, active agriculture supports a limited wildlife habitat value. In comparison to the general locale, only 0.5% of habitat loss (including habitat conversion) will occur as a result of the Project and is not considered a significant loss to the local setting.

Habitat Degradation (Forest Fragmentation)

Forest health, sustainability, and the ability of forests to provide ecosystems and products for a vast array of species, including humans, are affected to varying degrees and in different ways by changes in the fragmentation and urbanization of contiguous forestland. As stated previously, forest fragmentation occurs when large tracts of forestland become broken up into smaller patches due to canopy removal or the overall clearing of forests. Fragmentation occurs at variable sizes and patterns of discontinuity. The variation of size and pattern of fragmentation also have varying effects onto the many habitat preferences and ecologies of plant and animals, including wildlife documented within the Project Area. The potential effects of forest habitat fragmentation depend in part on previous land use, the original extent of intact forested habitat, the extent of habitat that will be impacted during and after construction, and the behavioral sensitivity of potentially affected species or species groups, which include both residents and migrants. The relative impacts of forest habitat removal or conversion to other vegetative cover types also depends on the configuration of impacted areas, the presence or absence of similar forest habitat proximal to the impacted area, and the types and level of activity (e.g., traffic volume, noise levels, and visual disturbances) expected in the affected areas. Impacts to species as a result of forest fragmentation may vary temporally and may have short-term or long-term effects depending on the species.

A key component resulting from fragmentation events is the creation of edge effects in areas which were previously continuous habitat. Edge effects are changes which occur in species populations or community structures which occur at the periphery of two habitats. Areas with small habitat fragments exhibit edge effects which may extend throughout the range. As the edge effects increase, the boundary habitat may in fact allow for greater biodiversity in the influx of successional species or generalist species suited to thrive between habitats. Forest fragmentation is documented to increase edge effect and could in turn, expose interior forest habitat to changes in climate which may alter growing conditions, aid in the introduction of new species which would increase competition for resources, and even expose the more rare forest interior species to increased mortality as a result of increased competition and predation events. Contrary, it may also provide an influx of new species to areas which may increase the general measured biodiversity of affected areas.

Edge effects vary somewhat with distance from forest edge, depending on the type of effect and species of vegetation or wildlife (USDA NRCS, 2012). However, within the State of New York, 300 feet is frequently used as a general range for the edge effect disturbance line. Which can be stated as the distance into a forest patch where the edge effect disappears and interior forest conditions are proposed to begin generally (USDA NRCS, 2012).

Existing land uses in and around the Project area include pasture, agriculture, and to a lesser extent, low-density residential and road development. Existing forested habitat at the Project consists of mostly hardwood forest stands composed of American beech (*Fagus grandifolia*), sugar maple (*Acer saccharum*), hickories (*Carya* spp.) and oaks (*Quercus* spp.). The southern and northern portions of the Project area are relatively fragmented due to increase agriculture areas. The central portion of the Project area contains a relatively large forest block (~1,500 acres) that is bisected by east-west-oriented Route 248 and Marsh Creek. The proposed transmission line runs for approximately 6.5 miles through both fragmented and intact forested areas. Eight turbines—numbers 8, 13, 15, 16, 19, 20, Alt 3, and Alt 4—are located in the interior portion of relatively non-fragmented forest blocks that are approximately 1,000 acres or larger. NYSDEC has suggested the effects of clearing on forest extend into the adjacent forest for 300 feet in all directions from cleared areas. Currently, there is approximately 11,317 forested acres within the Project Area and Facility Site for the approximately 16-mile overhead 115 kV transmission line.

It is expected that clearing for all Project components (access roads, collection lines, turbine pads, laydown areas, and the transmission line) associated with the Project may remove up to 301 forested acres, reducing the amount of forest land to 11,037 acres within the Project Area. This would be a relatively minor reduction, amounting to a loss of 2.47% of forestland within the Project Area, and Facility Site for the approximately 16-mile overhead 115 kV transmission line. Also as a result of the placement of Project components, there will be an assumed net loss of 612 acres of interior forest. As stated previously, interior forest is defined as core forest areas which contain a specific ecology and community structure which occurs at least 300 feet from the forest edge. Concurrently, there would also be a net gain of 317 acres of peripheral forest subjected to assumed edge effects (forest within 300 feet of the forest edge).

Fragmentation Impact to Birds

Within Stantec's analysis, the Project area, considered the minimum-convex polygon encompassing the anticipated clearing limits for turbines, access roads, and transmission corridor, consists of approximately 39,000 acres, of which 24,000 acres (62%) are forested. The categorization of bird species as "forest-interior specialists", "interior-edge generalists", "edge species", or "field-edge species", as outlined by Whitcomb et al. (1981) and modified by Freemark and Collins (1992), can be useful in conceptual understanding of potential impacts of habitat fragmentation (Villard 1998). Forest-interior habitat located deep within woodlands is sheltered from influences of forest edges and open habitats. Bird species that utilize forest interior habitat (forest-interior species) prefer these sheltered conditions due to availability of certain types of food, less nest disruption, and fewer predators. Conversely, forest edge habitat is typically sunnier, warmer, drier, windier, prone to more disturbance, and supports a higher density of predators than interior habitat. Bird species that utilize forest edge (edge species) are often generalists in terms of habitat needs, are well-adapted to these conditions, and can find their

nesting and foraging requirements at forest edges (Land Owner Resource Centre 2000). While such categorizations are useful in evaluating theoretical impacts of habitat fragmentation, bird species do not always conform to distinct categorizations as preferring "edge" or "interior" habitats. Also, continued presence of a species in an area affected by habitat removal or conversion does not necessarily indicate that the reproductive success of that species has been unaffected.

Pre-construction surveys were conducted in accordance with a work plan that was developed in consultation with the NYSDEC and the USFWS. Pre-construction breeding bird survey results and point counts conducted during spring and fall migration provide baseline data and an opportunity to assess potential impacts to residents and migrants associated with habitat fragmentation resulting from development and operation of the Project. The breeding bird community was evaluated in both forest habitat and non-forest habitat, which included field and forest edge. For figures showing survey locations, methods, and results, refer to 2016 Pre-Construction Avian and Bat Surveys, Eight Point Wind Energy Center (Appendix 22-5) and 2016 Pre-Construction Spring Migrating Bird Survey, Eight Point Wind Energy Center (Appendix 22-6).

During breeding bird surveys, as expected, most of the forest-interior individuals were observed in forest habitat and not in non-forest habitat (13 species, 54%). Eleven interior-species were observed in non-forest, indicating variation in the habitat used at the Project by forest interior birds during the breeding season. Breeding bird surveys were not designed to quantify reproductive success rates, so that information is unavailable.

Observations of forest-interior species during spring and fall migration surveys were common, with approximately the same total number of forest-interior bird observations recorded during these two surveys as during the breeding bird survey (see Table 22-4 below). Four species observed during the spring and fall migration surveys that were not observed during the breeding bird survey included blackburnian warbler (*Setophaga fusca*), brown creeper (*Certhia americana*), red-breasted nuthatch (*Sitta canadensis*), and ruffed grouse (*Bonasa umbellus*).

Table 22-4. Number of observations and locations of forest-interior species observed during breeding bird surveys at treatment points, Eight Point Wind Project, Spring 2016.

Forest-Interior Species	Scientific Name	Non-forest total (26 points)	Forest total (30 points)	All points total (56 points)	% observed in forested habitat
American redstart	*Setophaga ruticilla*	5	1	6	16.7
blackpoll warbler	*Setophaga striata*	1	0	1	0
black-throated blue warbler	*Setophaga caerulescens*	0	3	3	100.0
black-throated green warbler	*Setophaga virens*	0	14	14	100.0
blue-headed vireo	*Vireo solitarius*	0	1	1	100.0

Forest-Interior Species	Scientific Name	Non-forest total (26 points)	Forest total (30 points)	All points total (56 points)	% observed in forested habitat
Cape May warbler	*Setophaga tigrina*	0	1	1	100.0
chestnut-sided warbler	*Setophaga pensylvanica*	7	3	10	30.0
common raven	*Corvus corax*	0	2	2	100.0
dark-eyed junco	*Junco hyemalis*	4	27	31	87.1
eastern towhee	*Pipilo erythrophthalmus*	26	8	34	23.5
eastern wood-pewee	*Contopus virens*	0	3	3	100.0
great crested flycatcher	*Myiarchus crinitus*	0	1	1	100.0
hermit thrush	*Catharus guttatus*	1	0	1	0
ovenbird	*Seiurus aurocapilla*	0	57	57	100.0
red-bellied woodpecker	*Melanerpes carolinus*	0	2	2	100.0
red-eyed vireo	*Vireo olivaceus*	1	33	34	97.1
scarlet tanager	*Piranga olivacea*	3	7	10	70.0
veery	*Catharus fuscescens*	0	3	3	100.0
white-breasted nuthatch	*Sitta carolinensis*	0	3	3	100.0
winter wren	*Troglodytes hiemalis*	0	4	4	100.0
wood thrush	*Hylocichla mustelina*	1	10	11	90.9
yellow-rumped warbler	*Setophaga coronata*	2	0	2	0
Total		**51**	**183**	**234**	

Table 22-5. Number of observations and locations of forest-interior species observed during spring and fall migration surveys at treatment points, Eight Point Wind Project, 2016.

Forest-Interior Species	Scientific Name	Non-forest points total	Forest points total[1]	All points total[1]	% observed in forested habitat
Blackburnian warbler	Setophaga fusca	0	2	2	100.0
black-capped chickadee	*Poecile atricapillus*	19	131	150	87.3
black-throated blue warbler	*Setophaga caerulescens*	0	1	1	100.0
black-throated green warbler	*Setophaga virens*	0	2	2	100.0
blue-headed vireo	*Vireo solitarius*	0	6	6	100.0
brown creeper	*Certhia americana*	0	1	1	100.0
common raven	*Corvus corax*	2	1	3	33.3
dark-eyed junco	*Junco hyemalis*	8	15	23	65.2
eastern towhee	*Pipilo erythrophthalmus*	2	2	4	50.0
eastern wood-pewee	*Contopus virens*	0	1	1	100.0
ovenbird	*Seiurus aurocapilla*	0	6	6	100.0
red-breasted nuthatch	*Sitta canadensis*	1	4	5	80.0
red-eyed vireo	*Vireo olivaceus*	1	1	2	50.0
ruffed grouse	*Bonasa umbellus*	0	2	2	100.0
white-breasted nuthatch	*Sitta carolinensis*	2	25	27	92.6
winter wren	*Troglodytes hiemalis*	0	4	4	100.0
Total		**35**	**204**	**239**	

[1] Spring and fall migration surveys had some points in common; other points were unique to either the spring or fall survey due to changes in project layout between the two seasons. For the purposes of this analysis, observation data were pooled for non-forest and forest points visited during both spring and fall migration surveys.

The pre-construction surveys indicate that the Project area supports a diversity of songbirds typically found in similar habitats in the region, including a variety of fragmentation-sensitive forest-interior species. Forest-interior species such as ovenbird (*Seiurus aurocapilla*), red-eyed vireo (*Vireo olivaceus*), scarlet tanager (*Piranga olivacea*), and wood thrush (*Hylocichla mustelina*) (all observed during breeding

bird surveys) are sensitive to fragmentation and may experience reproductive dysfunction as a result of forest fragmentation (Donovan and Flather, 2002). Ground or open-nesting species should be most sensitive to fragmentation, and may experience low nesting success due to nest predation and nest parasitism (Lampila et al. 2005). Species in this category include ovenbird and veery (Cornell University, 2015). Ovenbirds were frequently observed at the Project site at forest points and not at non-forest points. Few veerys were documented (n = 3). The forest interior species observed in the Project area are regionally common and none is federally or state-listed (NYSDEC, 2015a). One species, Cape May warbler (*Setophaga tigrina*), is a High Priority New York Species of Greatest Conservation Need (SGCN), and three species, black-throated blue warbler (*Setophaga caerulescens*), scarlet tanager, and wood thrush, are SGCN experiencing some level of population decline (NYSDEC, 2017).

The North American population of Cape May warblers has declined by over 2.5% per year between 1966 and 2015 based on the North American Breeding Bird Survey (Sauer et al. 2017); however, trends in local populations fluctuate and appear to positively correlate with the abundance of spruce budworm (Kendeigh 1947, Morris et al. 1958, and Sanders 1970 as cited in Baltz and Latta 1998). Logging, particularly in the western portion of the species' range, is a known threat (Cornell University, 2015). As with many other forest interior species, including the three SGCN species observed at the Project, previous habitat loss and habitat fragmentation are known threats to breeding individuals. How and to what extent these threats have impacted the regional population has not been documented.

Construction and the subsequent use of service roads minimize impacts to bird communities, more so than the construction of highways and other major roads, due to smaller clearing sizes and widths, lower levels of traffic, and lower vehicle speeds (Jacobson 2005). The primary potential habitat-related impacts to songbirds that could be anticipated as a result of construction and operation of the Project may be increased predator activity along edges, which could either reduce reproductive success or remove viable habitat for certain vulnerable species (e.g., ground nesting songbirds). Certain species that are least tolerant of edges, or more susceptible to nest predation, may suffer reduced reproductive success over the long-term, based on cumulative landscape conversion in the Project area and surrounding region. However, nesting habitat for forest interior birds is not limited within the region. Forested habitat, including in wildlife areas managed within the Canisteo River Basin Unit Management Plan, is abundant in the region. Such state-managed forested habitat includes Greenwood State Forest, the Rock Creek State Forest, and the Turkey Ridge State Forest in the towns of Greenwood and Jasper.

Empirical studies of the effects of constructing wind projects on breeding bird populations with similar landscapes elsewhere in New York have not documented substantial shifts in species presence or distribution before and after construction. A breeding bird study was conducted after construction of the Howard Wind Project in Steuben County, New York, to assess the potential bird avoidance of, and/or habituation to, turbines in a fragmented landscape. Surveys did not document systematic shifts in species composition or abundance based on proximity to turbines, nor did they document behavioral avoidance of turbines. Only the passerine subtype creepers and nuthatches exhibited statistically significant patterns of avoidance across the 2-year study (West, 2014).

Given that conservatively, only about 1% of forested habitat at the Project is expected to be cleared, that access roads will have low levels of vehicle use, and that most of the turbines and access roads will be sited in previously cleared areas or on forest edges, it is unlikely that this Project poses a significant

risk of habitat fragmentation impacts to bird communities. Clearing for the transmission line will impact intact forest habitat, however, within a relatively narrow band 100-feet wide. Best management practices related to revegetation and reducing the likelihood of colonization by invasive plants will be required. The interior species observed in the Project area will likely continue to persist after Project construction. Habitat-related impacts associated with a wind project of this type are expected to be less than those associated with activities requiring greater percentages of deforestation, larger-scale construction activities, and greater human presence, such as large-scale agriculture, logging, transportation, and urban development. Species known to be sensitive to fragmentation are currently present in partially fragmented areas of the Project. Given the persistence of these species, and the fact that Project-related activities will result in minimal amounts of additional habitat fragmentation, it is likely that these species will continue to persist after small amounts of additional fragmentation.

Fragmentation Impact to Bats

Potential effects of habitat fragmentation on bats are not well understood. Fragmentation may affect two aspects of bat ecology: foraging and roosting. Potential mechanisms of impact may vary among species but could include increased parasitism and/or predation, narrowed niche breadth, or shifts in home ranges (Segers and Broders, 2014). Forest structure plays an important role in determining the suitability of foraging habitat, with different species selecting foraging habitat according to their prey preferences and flight morphology. Large bats such as migratory hoary bats (*Lasiurus cinereus*), eastern red bats (*Lasiurus borealis*), and silver-haired bats (*Lasionycteris noctivagans*) tend to be less maneuverable and prey on larger insects (Aldridge and Rautenbach, 1987; Fenton, 1990). As a result, these species tend to forage in open habitats or above the forest canopy. Small, highly maneuverable bats such as northern long-eared bats (*Myotis septentrionalis*) and eastern small-footed bats (*Myotis leibii*) typically forage closer to the ground, often beneath the forest canopy. Many bat species forage along forest edges, riparian corridors, and other gaps in the forest. Accordingly, having a matrix of forest types and structural elements including gaps, edges, and corridors likely increase the overall diversity of bat species in an area, provided a sufficient amount of roost opportunities and access to water exists (Krusic et al., 1996).

The clearing of linear corridors (e.g., access roads and transmission lines) and patches (e.g., turbine clearings) in an otherwise forested landscape will increase the amount of edge habitat present and reduce the amount of forest interior habitat. Accordingly, bat species that forage along forest edges and within open areas are likely to benefit from these activities whereas available habitat will be reduced for species preferring to forage within forest interior. Indeed, bat species appear to respond differently to forest thinning or clearing, probably due to a combination of prey availability, foraging behavior, or influence of forest structure on factors such as wind speed (Patriquin and Barclay, 2003; Segers and Broders, 2014). Forest interior specialists, such as northern long-eared bats, have shown a positive association with larger forest patch size, although effects differed among males and females (Henderson et al. 2008). However, forest fragmentation typically does not negatively impact bat diversity or abundance in a forested landscape unless remnant forest patches are very small or widely isolated (Lesiński et al., 2007; Medelin et al., 2010).

A bat acoustic survey was conducted at the Project in July and August 2016 (See Appendix 22-7). The survey used 43 detectors placed throughout the Project area in corridor habitat (linear, cleared

features), edge habitat, and forest canopy openings (small openings surrounded mostly by forest). The survey detected species known to occur in New York, and species were relatively evenly distributed among the three habitat types surveyed. As described above, a small percentage of the existing forested habitats within the Project area will be cleared, and remaining corridor, edge, and forest habitat should provide ample foraging opportunity for bats. Further, the vast majority of impacts to wetland resources, which provide preferred foraging habitat for many bat species in the region, will be avoided. It is unlikely that the species composition of bats at the Project will change much as a result of forest clearing during Project construction. Potential impacts have been minimized to the maximum extent practicable.

Roost trees may be maternity roosts or day/temporary roosts with one or few individuals. Loss of maternity roost trees as a result of forest clearing, if occupied at the time of clearing, could impact local bats. Loss of day roost trees could also occur as a result of forest clearing. However most bat species that reproduce in New York are not thought to be limited by roost availability. Specifically, roost habitat is not considered a limiting factor for the federally threatened northern long-eared bat, which could occur in the Project area (USFWS, 2016).

Construction of the Project will not negatively impact the suitability of foraging or roosting habitat for bats. The distribution of species across the Project area may shift somewhat as a result of creating additional edge habitat and cleared corridors, although sufficient intact forest patches will remain for species that forage within the forest interior habitats as well as those that prefer open habitats and edges.

Habitat Disturbance and Wildlife Displacement

Operation of turbines and the placement of other Project components can result in habitat alteration and potentially disturbances to specific species. These types of impacts could make a site unsuitable for a certain species' use. However, as stated previously, the overall impact to local wildlife habitat as a result of the Project is believed to be marginal. Intrinsically, the effect of the Project on the use of local habitats by wildlife will also be nominal.

However, secondary (or indirect) impacts can also occur as a result from the operations of a wind farm. Indirect impacts to wildlife as a result of wind farm activity are not well known. There are multiple factors which cause the measurement and study of indirect impacts to be problematic. Studies must often be undertaken over long time periods and with intensive research conducted on each of the multiple components which are utilized to construct a wind generating facility (roads, transmission lines, turbines, substations, increase public access, etc.). There can also be a myriad of complex influences to measure and regulate, including weather pattern changes, various community ecologies, habitat preferences, and distance gradients. The amount of research in the peer-reviewed literature continues to grow, reflecting the continued interest in understanding wind-wildlife interaction. Past studies have noted behavior changes in some local wildlife species, including, but not limited to, large and small-scale avoidance, attraction to disturbance areas or Project components, changes in food preferences, and changes to breeding site frequency. Below are discussions of indirect impacts to certain species as a result of the Project.

Game Species

Immediate disturbances during the construction phase of the Project will cause disruption of local game species (white-tailed deer, ruffed grouse, turkey, etc.). However, after the construction phase of the Project is completed, game species generally will adapt to man-made features in the habitats, and will even use the newly cleared areas for foraging. As such, significant displacement of game species will not occur as a result of the Project.

Breeding Birds

It is presumed that some wildlife may become accustomed to the presence of wind turbines over time. However, long-term behavior modification in wildlife as a result of wind farm construction and operation is currently undetermined, because few long-term studies have been conducted on the subject. One study, reported in 2015, conducted a before-after-control-impact (BACI) assessment to determine if wind facilities placed in native mixed-grass prairies displaced breeding grassland birds (Shaffer and Buhl, 2016). Researchers examined whether displacement or attraction occurred one year after construction (i.e., immediate effect) and the average displacement or attraction 2–5 years after construction (i.e., delayed effect). Displacement occurred for seven of the nine species investigated. One species was unaffected by wind facilities and one species exhibited attraction. Displacement and attraction generally occurred within 100 meters and often extended up to 300 meters from turbine locations. Some evidence indicates that some grassland breeding bird species may be adversely impacted by wind turbines being placed in their habitats. Also, to a lesser degree, some species may be attracted to the placement of wind turbines. It is presumed that breeding grassland bird species could potentially incur some permanent displacement as a result of the siting of turbines. However, displacement should be limited to the immediate area of each turbine. Also, most turbine locations are sited in active agricultural areas; therefore, displacement could be influenced by other factors, including active agricultural practices in the vicinity. Any potential impacts to grassland-nesting species are anticipated to be much less than the impacts from existing hay mowing and pesticide use in the same area, as these practices are more widespread. Therefore, it is presumed that there is a low risk of substantial displacement of breeding grassland birds as a result of the Project.

Migratory Waterfowl

It is presumed that the Project will not significantly impact behaviors or populations of migratory waterfowl. The term 'Waterfowl' defines associated bird species which frequent open waters. Waterfowl definitions are generally associated with swimming game birds of the taxonomic order Anseriformes (e.g., ducks and geese), which are distinguished from upland game birds and shorebirds. During the siting of Project components, large open water areas were avoided primarily in order to reduce impacts to local hydrological features. As a direct result of this action, impacts to waterfowl within their natural habitat preferences will also be diminutive. Common migratory waterfowl throughout the region with which the Project Area resides, have been also well documented and observed foraging in large population clusters within disturbed areas, such as along major highways, within public parks, and within upland and active agricultural fields. Disruption to birds which use these disturbed areas is not expected during the construction and operation of the Project due to the familiarity of these select species to increased anthropogenic disturbance levels.

Such a conclusion is further supported by results of studies conducted on the subject matter. One study was undertaken by the Iowa Cooperative Fish and Wildlife Research Unit (Jain et al., 2004). This research group investigated waterfowl disturbances at the *Top of Iowa Wind Farm* located in Worth County, Iowa. This wind farm was selected due to its close proximity to three state-owned wildlife management areas. This specific wind facility experiences very high influxes of waterfowl (i.e., over 1.5 million duck and goose use-days per year). Observations at that site revealed that wind turbines did not affect the use of multiple species of waterfowl. Based on the aforementioned study results and the placement of Project components outside of habitats preferred by waterfowl, the construction or operation phases of the Project will not create significant, long-term displacement or mortality events on resident or migrating waterfowl.

Raptors

It is presumed that raptors, or birds of prey, may experience displacement due to the loss of suitable habitat resulting from the construction of the Project. In reference to *Responses of raptors to a windfarm* (Garvin et al., 2011), research published in the *Journal of Applied Ecology* stated that a study of an active windfarm in southeastern Wisconsin measured use by raptors at the site during both pre- and post-construction. Data analyzed during the research effort provided evidence for possible displacement and an increased collision risk for raptors during post-construction of wind turbine facilities. The study found that abundance of raptors in all local species groups was lower in the first year of post-construction monitoring than levels documented during preconstruction. Through analysis, it was determined that this population reduction was attributed to disturbance from construction and ongoing presence of wind turbines. However, research also suggested that observed and estimated avoidance rates, coupled with low mortality events, may also indicate the emergence of effective avoidance behaviors by individuals that remain within the windfarm project area and adapt (Garvin et al., 2011). Disturbances to local raptor populations will occur and individuals may transition to similar habitats outside of the Project Area. Also, individuals which remain in the Project Area may begin to display effective avoidance behaviors and adequately adapt to the presence of the Project.

Threat of Bird and Bat Collision

To ascertain the potential collision risk to local bird and bat species as a result of the operation of the Project, Stantec conducted analyses on cumulative effects associated with collision mortality of birds and bats from the proposed Project in light of current and projected wind energy development within the state of New York. Stantec's analysis assumed the Project would comprise up to 31 turbines and up to 102 megawatts (MW) of installed capacity. Further, this analysis assumed that this Project will implement no operational adjustments. However, the need for and scope of operational adjustments, e.g., seasonal length, nightly period, temperature threshold (if applicable), and cut-in speed will be discussed with the agencies.

To inform mortality predictions related to the Project, Stantec utilized publicly available mortality estimates from post-construction studies conducted at operational New York wind energy facilities. For decades, researchers have studied and estimated bird mortality from several sources, such as collision with man-made structures, legal hunting, and domestic cat depredation (USFWS, 2002; Erickson et al*., 2005*). Historically, loss of habitat and direct persecution were considered the largest threats to bats (BCI

2001). The emergence of wind energy development over the past decade has introduced a new source of mortality for birds and bats, as spinning or stationary wind turbines pose a collision risk, particularly for the migratory tree-roosting bats. Post-construction monitoring data, the primary source of knowledge about turbine-collision mortality, and the rapid expansion of wind development have raised concerns about the potential for substantial cumulative impacts to bats from turbine mortality. Carcasses of cave-dwelling bats are not detected as frequently as migratory tree-roosting bats (Arnett and Baerwald, 2013). However, this mortality is adding cumulative impacts on cave-dwelling species in the wake of white-nose syndrome (WNS). In addition to mortality at wind energy projects, Stantec's cumulative effects analysis also considers impacts associated with other known mortality sources for birds and WNS for bats.

According to data compiled by the American Wind Energy Association, there were 1,052 turbines with 1,829 MW of installed capacity operating in New York by the end of March 2017 (AWEA, 2017; average turbine capacity 1.74 MW). The U.S. Energy Information Administration's energy forecasts recently indicated a nationwide growth rate of 2.5% annually for installed wind energy capacity from 2016 through 2050 (USEIA, 2017). This Project is proposed to be on line by the end of year 2019. In application of the 2.5% annual growth rate to the current installed capacity, there results in an estimated installed capacity of 1,104 turbines and 1,922 MW by the end of 2019. Applying this annual growth over the 30 years of projected Project operation, there is an estimate of a total capacity of 2,316 turbines and 4,031 MW in New York by year 2049.

Whether proposed wind projects are ultimately constructed and become operational is subject to several factors, such as energy markets, policies, regulations, and availability of incentives. Also it is proposed that the average turbine capacity size is likely to increase, and the number of operating turbines in New York may be less than the estimated 2,316 turbines by 2049. It should be stated that this estimate of turbines in New York was obtained only using one method among several that could be implemented. Nonetheless, this method represents a straightforward means of estimating the numbers of operating turbines in New York based on the national average and the state's current policy for continued increase of wind energy as a total share of the electric energy generation in New York (Clean Energy Standard; NYSDPS, 2016a).

Bird Collison Risk

There is an expected mortality, disturbance, and displacement of birds due to the construction and operation of the Project. Stantec's cumulative effects analysis for birds primarily focuses on mortality attributable to the Project in the context of other existing and future wind projects in New York. This analysis also briefly considers other anthropogenic sources of bird mortality and includes past and present actions and reasonably foreseeable future sources of impacts to birds during the estimated 30-year operation of the Project.

Table 22-6 below provides Stantec's estimates of anthropogenic sources of bird mortality for the U.S. It is understood that the national level is not a desirable data pool to establish a cumulative effects analysis area for the Project. Similar data scaled to New York State or any other region are not readily available. The values in Table 22-6 are derived from multiple sources (see footnote of table).

Table 22-6. Estimated annual avian mortality from anthropogenic causes in the U.S.

Mortality source	Estimated annual mortality	% of overall mortality
Depredation by domestic cats	1.4–3.7 billion	71–75
Collisions with buildings (including windows)	97–1,200 million	5–23
Collisions with power lines	130–174 million	3–7
Legal harvest	120 million	6
Automobiles	50–100 million	2–3
Pesticides	67–72 million	4
Communication towers	4–50 million	<1
Oil pits	1.5–2 million	<1
Wind turbines	20,000–440,000	<1
Total mortality	1.9–5.2 billion	

Sources: USFWS (2002), Erickson et al. (2005), Thogmartin et al. (2006), Dauphiné and Cooper (2009), Manville (2009), Loss et al. (2013).

Compared to other anthropogenic sources of avian mortality, the effect of avian mortality at wind energy facilities is very minor.

In reference to mortality estimates at the proposed Project and in related wind energy projects throughout New York, Stantec compiled estimated numbers of bird fatalities at the Project and wind energy facilities across New York based on mean, minimum, and maximum fatality rates. Using results from 23 post-construction monitoring studies conducted across 13 wind energy facilities in New York, the mean bird mortality rate was estimated to be 4.09 birds per turbine per year. Based on this rate, it is estimated that Project operation may kill up to 127 birds annually. The state-wide mean bird mortality rate was applied to the estimated installed capacity of wind facilities in New York by 2019 which is assumed to be 1,104 turbines. As such, it is estimated that wind energy facilities in New York may kill roughly 4,500 birds annually. The proposed Project's contribution to this total annual mortality would be 2.8%. Over its proposed 30-year operational life, the Project is estimated to kill approximately 3,800 birds. After the Project has been operational for 30 years, it is estimated that wind energy projects in New York at that time will have killed more than 200,000 birds in the 30 year timespan. The Project's contribution will be roughly 1.9% of the total bird mortality estimated to occur from installed wind energy facilities in New York through year 2049.

More specifically, cumulative impacts from this Project when compared to active and proposed wind generating facilities which are in close proximity to the Project were acknowledged by either the Applicants own intuitive action or deemed to be incorporated in the cumulative impact analyses through NYSDEC request. These specific projects are the Cohocton, Dutch Hill, Howard, and Marsh Hill Wind facilities (all operational) as well as the proposed Canisteo Wind and Baron Wind projects (which at time of this Application have submitted a Public Involvement Program (PIP) Plan and Preliminary Scoping Statement (PSS), respectively. It should be noted that including wind facilities which are not yet

operational and having completed the Article 10 process should be looked upon as a very conservative approach of assessing cumulative impact measurements. Cumulative impact numbers stated herein, should thus be viewed as conservative measurements subject to change under the assumption that the proposed projects may not actually become operational.

In utilizing the aforementioned estimated rate of 4.09 birds killed annually per turbine per year, Cohocton and Dutch Hill Wind with 50 operational turbines result in a potential mortality of up to 204.5 birds annually. Correspondingly, Marsh Hill with an operational 12 turbines potentially kill up to 49.08 birds per year and Howard Wind with an active 27 turbines potentially kill up to 110.43 birds per year. If the current proposed turbine amounts remain for the two proposed wind projects, then Baron Winds with a proposed 76 turbines would result in a potential mortality of up to 310.84 birds per year, and Canisteo Wind with a proposed maximum of 140 turbines would result in a potential mortality of up to 572.6 birds per year. In total these operational and proposed nearby wind projects, including the Eight Point Wind Project, would kill up to 1,374.45 birds per year. Conclusively, this Project would contribute to only 9.24 percent of the total annual bird mortality of these locally proposed and active wind projects.

When applying the total proposed local take of avian species annually of 1,374.45 birds to the state annual mortality by 2019, the three active wind generating facilities (Howard, Marsh Hill, Cohocton and Dutch Hill) already contribute to the assumed statewide take of 4,500 birds per year. The Project, along with the proposed Canisteo Wind and Baron Winds projects, would kill up to an additional 1,010.44 birds per year increasing the statewide average by 22.45% and the total annual birds killed by turbines state wide to 5,510.44 birds. However, this Project would only contribute a fraction of this increase with 127 birds taken annually which equates to contributing only a 2.3% mortality percentage to this new state average.

Table 12-7. Annual and cumulative bird mortality estimates at the Eight Point Wind Energy Center and current and projected installed wind energy capacity in New York. Mortality rates are expressed in birds per turbine per year (birds/turbine/year).

Eight Point				State-wide Projects				
		Annual mortality	30-year cumulative mortality	Annual mortality in 2019	Facility % contribution to annual mortality	Annual mortality in 2049	30-year cumulative mortality	Facility % contribution to 30-year cumulative mortality
Mortality rate (birds/t/y)[1]		31 turbines	31 turbines	1,104 turbines[2]	31 turbines	2,316 turbines[3]	1,104-2,316 turbines	31 turbines
Minimum	0.75	23[4]	698	828	2.8	1,737	~37,300	1.9
Maximum	15.50	481	14,415	17,118	2.8	35,905	~770, 300	1.9
Mean	4.09	127	3,804	4,517	2.8	9,474	~200,300	1.9

[1] Rates based on the minimum, maximum, and mean of observed fatality rates from 23 post-construction studies at 13 wind energy facilities across New York (Appendix 22-10, Table A-1).
[2] Estimated installed capacity using 2.5% annual growth per year (USEIA 2017) based on installed capacity at end of March 2017 (AWEA 2017).
[3] Estimated installed capacity based on a projected annual growth of 2.5% per year (USEIA 2017) from 2019 through 2049. Assumes no decommissioning of projects.
[4] Values were calculated and at times rounded in a spreadsheet application.

Within a Final Supplemental Environmental Impact Statement, the NYSDPS (2016b) acknowledged a range of estimated bird mortality rates in New York from 0.66 to 9.59 birds per turbine per year. Based on the buildout of wind projects in New York at the end of 2019 (1,104 turbines), annual bird mortality in the state may range from 729-10,587 birds. The aforementioned calculated mean rate and annual mortality for the proposed Project are both near the middle of these two ranges.

More than 70% of total bird mortality for the Project will be composed of birds from the passerine group based on data from available studies (NRC 2007). It should be noted that no study has documented that a wind energy facility has caused a significant population-level impact to any one species of bird. This is largely because species of nocturnal migrant passerines most frequently found during turbine searches are regionally abundant (Johnson et al. 2002; NRC 2007; Arnold and Zink 2011). Below, a comparative analysis is used to describe the general context for consequences of bird mortality in relation to the Project and other wind energy facilities in New York using five example species.

Carcass searches during monitoring at four (4) wind energy facilities within 50 miles of the Project documented wood thrush (*Hylocichla mustelina*), black-billed cuckoo (*Coccyzus erythropthalmus*), and bobolink (*Dolichonyx oryzivorus*), all considered to be *Partners in Flight* species of continental importance for the Appalachian Mountains region (Rosenberg et al. 2016). Also the red-eyed vireo (*Vireo olivaceus*) and golden-crowned kinglet (*Regulus satrapa*) were documented which are two species that are common in New York and frequently killed at New York wind energy facilities. Based on data during years 2003 through 2016 at wind projects in the northeast and Ontario, post-construction

monitoring carcass surveys documented nine (9) wood thrushes, 10 black-billed cuckoos, 41 bobolinks, 259 red-eyed vireos, and 174 golden-crowned kinglets out of the total 2,167 birds.

Table 22-8. Estimates of annual and cumulative turbine mortality compared to population estimates for five species of birds that have been detected during post-construction monitoring at wind energy facilities in New York.

Species	New York population[1]	Proportion of total fatalities[2]	Annual mortality in 2049 based on mean rate, 4.09 birds/t/y	Percent of population affected	Cumulative mortality in 2049 based on mean rate, 4.09 birds/t/y	Percent of population affected	Breeding Bird Survey trend in New York, 2005-2015[3]
Wood thrush	620,000	0.0042	39	0.006	844	0.136	Declining-significant trend
Black-billed cuckoo	30,000	0.0046	44	0.146	938	3.127	Declining, significant trend
Bobolink	420,000	0.0189	179	0.043	3,846	0.916	Declining, significant trend
Red-eyed vireo	3,800,000	0.1195	1,132	0.030	24,294	0.639	Increasing, non-significant trend
Golden-crowned kinglet	300,000	0.0803	761	0.254	16,321	5.440	Increasing, non-significant trend

[1] Taken from Partners in Flight population estimates database (PIF Science Committee 2013). These data are based on an average of Breeding Bird Survey data from 1998–2007 (Blancher et al. 2013).
[2] Based on a list of species and their numbers killed at wind energy facilities in the northeast U.S. and Ontario from 2003–2016 as reported in post-construction monitoring reports. Proportions by species were calculated relative to the total number, i.e., 2,167 birds.
[3] North American Breeding Bird Survey 1966–2013 Analysis (Sauer et al. 2017).

Table 22-8 displays estimates of annual bird mortality in 2049 and cumulative bird mortality from years 2019 through 2049 for the three important and two common bird species relative to current population estimates in New York. The mean mortality rate for New York projects (4.09 birds per turbine per year) as well as the projected number of turbines (2,316) operating in New York in 2049 were also utilized. Wind projects in the cumulative effects analysis area for this Project will kill roughly 9,500 birds in 2049. Using the mean fatality rate, wind projects are estimated to affect <1% of the population annually of the three Partners in Flight important species.

Cumulatively in 30 years, wind projects in New York are estimated to kill more than 200,000 birds (Stantec, 2017). Based on the available data, red-eyed vireos and golden-crowned kinglets will each make up roughly 12% and 8% of this total mortality, respectively. Using the mean rate, the 30-year cumulative mortality is estimated to affect roughly 5% of the golden-crowned kinglet population, which seems high relative to the other species listed in Table 22-8. The New York population of golden-crowned kinglets is estimated to make up 0.3% of the global population, and this species is not determined to be declining (PIF Science Committee 2013).

The annual and cumulative mortality estimates were applied to single population values at one moment in time, and the calculations do not include other variables often used in population dynamics such as recruitment and other sources of mortality. Despite these limitations, the results do indicate a relatively low risk for significant population declines caused by wind power in New York. Wind projects in 2049 would kill <1% of the most current estimated New York population sizes of five species. In summary, it is not expected that wind projects in New York will cause population-level effects to avian resources, even those species of conservation concern.

The proposed Project is not expected to cause naturally occurring populations of common or rare birds to be reduced to numbers below levels for maintaining viability at local or regional levels. Resulting bird mortality will contribute cumulatively to other causes of mortality, specifically other wind projects and other anthropogenic sources as listed above in Table 22-8. Less than 1% of all estimated anthropogenic bird mortality is attributed to wind projects. It is not anticipated that mortality at wind facilities in New York is likely to result in population-level impacts to any species of bird.

Bat Collison Risk

As stated previously, the Project has the potential to kill bats during operations. For purposes of analysis it was assumed that bats will sustain the same effects at all wind energy facilities in New York. This analysis also considers the effects of WNS, which has resulted in significant bat mortality since its discovery in 2006.

The table below provides a summary of cumulative effects to bats estimated for the Project, other existing wind facilities in New York, and future installed capacity of wind energy in New York. Rates of mortality of bats vary substantially among projects and depend on factors such as operational decisions, turbine type, and landscape characteristics. For the purposes of assessing cumulative impacts to bats for this specific Project and statewide, information from 21 post-construction studies conducted at 13 wind energy facilities in New York was utilized to derive a minimum, maximum, and mean bat fatality rate (Table 22-9). These studies were conducted from 2009 through 2015 to reflect data collected after WNS was discovered for most of New York. The mean mortality rate is estimated to be 11.50 bats per turbine per year. Without adopting measures to minimize potential impacts (i.e., feathering and curtailment strategy) at the onset of the operation phase of the Project could result in a mean measurement of bat mortality equaling 356 bats annually and 10,695 bats over a 30-year term.

The mean mortality rate of 11.50 bats per turbine per year was used to estimate cumulative effects to bats at wind energy facilities in New York during the assumed 30-year operational life of the Project. Bat

mortality rates from these projects were based on operations that implemented no feathering or curtailment.

Table 22-9. Cumulative bat mortality estimates at the Eight Point Wind Energy Center and current and projected installed wind energy capacity in New York.

Eight Point				Statewide Projects				
		Annual mortality	30-year cumulative mortality	Annual mortality in 2019	Facility % contribution to annual mortality	Annual mortality in 2049	30-year cumulative mortality	Facility % contribution to 30-year cumulative mortality
Mortality rate (bats/t/y)[1]		**31 turbines**	**31 turbines**	**1,104 turbines[2]**	**31 turbines**	**2,316 turbines[3]**	**1,104-2,316 turbines**	**31 turbines**
Minimum	1.54	48[4]	1,432	1,701	2.8	3,567	~76,500	1.9
Maximum	40.04	1,241	37,237	44,219	2.8	92,752	~2 million	1.9
Mean	11.50	356	10,695	12,700	2.8	26,639	~571,500	1.9

[1] Rates based on the minimum, maximum, and average of observed mortality rates from 21 post-construction studies at 13 wind energy facilities across New York in years 2009–2015 (post-WNS; Appendix 22-10, Table A-2).

[2] Estimated installed capacity using 2.5% annual growth per year (USEIA 2017) based on installed capacity as of end of March 2017 (AWEA 2017).

[3] Based on a projected annual growth of 2.5% a year (USEIA 2017). Assumes no decommissioning of projects.

[4] Values were calculated and often rounded in a spreadsheet application.

It is assumed that migratory tree-roosting bats (eastern red bat [*Lasiurus borealis*], hoary bat [*Lasiurus cinereus*], and silver-haired bat [*Lasionycteris noctivagans*]) account for 78% of all bat fatalities (Arnett and Baerwald 2013). Generally speaking, this percentage has been observed at wind energy facilities throughout the eastern and Midwestern U.S. It is also assumed that there is a fatality rate of 11.50 bats per turbine per year which is applicable for all facilities in New York and will remain constant during the 30 years of Project operation with no behavioral modification in bats and no mitigation measures in Project operations. When this mortality rate is applied to the 1,104 turbines projected to be installed in New York in 2019, a mortality estimate of roughly 12,700 bats is assumed.

When applying this rate to the projected installed capacity of 2,316 turbines in year 2049, an annual mortality of approximately 27,000 bats is assumed in New York and a cumulative total of roughly 571,500 bats are assumed to be taken during this 30-year period, of which more than 446,000 will be migratory tree-roosting bats, and the remaining will be cave-dwelling bats. Applying the highest rate observed at wind energy facilities in New York (40.04 bats per turbine per year) triples the amount of assumed fatalities. However, this rate is considered by Stantec to be extraordinarily high, and it is not anticipated that bat mortality rates would typically be this high at all wind facilities statewide.

Applying the highest rate observed at wind energy facilities in New York (40.04 bats per turbine per year) triples the amount of assumed fatalities. However, this rate is considered by Stantec to be unusually high, and it is not anticipated that bat mortality rates would typically be this high at all wind

facilities statewide. Of the 19 post-construction studies Stantec reviewed, 5 studies (26%) estimated rates <5.00 bats per turbine per year. Twelve of the studies (63%) reported rates <10 bats per turbine per year.

Only one study had estimated rates of 40 or more bats per turbine per year (5%). As such, the maximum bat mortality rate reported for New York (40.04 bats per turbine) is included to illustrate the worst-case scenario and is not representative of statewide trends. This data point was taken from one of three post-construction studies conducted at the Cohocton and Dutch Hill Wind Farms and other mortality estimates for the site were substantially lower (25.62 bats per turbine per year in 2010; 8.03 bats per turbine per year in 2013). The maximum value in a distribution of mortality estimates from a state would be much less representative of statewide patterns than the median (8.22 bats per turbine per year for the 19 post-construction studies) or mean, which in this case was used to estimate cumulative impacts. The rate of 11.50 bats per turbine per year is the more reasonable assumed rate, and the statewide mortality rate for bats could become less as the implementation of operational adjustments is becoming more common and may significantly reduce the average statewide mortality rate.

Cumulative mortality at the proposed Project will account for roughly 1.9% of the cumulative mortality of bats in the assumed 30 years of operation. Each wind energy facility will contribute to all-bat mortality, and each facility's contribution will be proportional to the number of turbines. Looking at future wind energy development in New York, it is impossible to determine to what extent the cumulative estimate of 571,500 bat fatalities over 30 years may result in population-level impacts as no baseline population estimates exist for those species that will experience the greatest mortality, i.e., the migratory tree-roosting bat species. Populations have been estimated for only the Indiana bat (*Myotis sodalis*) and northern long-eared bat (*M. septentrionalis*).

WNS has emerged as the largest single source of mortality for cave-hibernating bats in recent years (Stantec, 2017). As of March 2016, WNS has been confirmed in 30 states and five (5) Canadian provinces and as far west as King County, Washington. The USFWS estimated WNS has killed more than 6 million bats since discovery of the disease in 2006 (USFWS 2017). Turner et al. (2011) documented an 88% decline in overall numbers of hibernating bats comparing pre- and post-WNS counts at 42 sites in five (5) northeastern states. At these sites, northern long-eared bats decreased by 98%, little brown bats (*Myotis lucifugus*) by 91%, tri-colored bats (*Perimyotis subflavus*) by 75%, Indiana bats by 72%, big brown bats (*Eptesicus fuscus*) by 41%, and eastern small-footed bats (*M. leibii*) by 12% (Turner et al. 2011). To date, causative fungus, *Pseudogymnoascus destructans*, has been found in two migratory tree-roosting bat species (eastern red bat and silver-haired bat) without confirmation of the WNS disease (USFWS 2017).

It is apparent that bat mortality at wind energy facilities contributes to overall bat mortality, and the Project's resulting bat mortality will contribute cumulatively to other wind facility mortality. Compared to the effects of WNS, cave-dwelling bat mortality at wind energy facilities is very minor. However, wind energy facilities kill more migratory tree-roosting bats than any other known mortality source. Because these species' population sizes are not known, it is unclear how wind energy will impact their populations.

By 2049, wind facilities in New York are predicted to result in more than 571,500 bat fatalities, most of these being migratory tree-roosting bats (~78%). The effect of cumulative mortality on bat populations is highly uncertain because estimates of current population sizes are unknown. Bat mortality at the Project is not expected to be a significant addition to the cumulative bat mortality at wind energy facilities in New York, given the relatively small number of turbines.

In utilizing the aforementioned estimated rate of 11.50 bats killed annually per turbine per year, Cohocton and Dutch Hill Wind Farms with an active 50 turbines potentially kill up to 575 bats annually. Correspondingly, Marsh Hill with an active 12 turbines potentially kill up to 138 bats per year and Howard Wind with an active 27 turbines potentially kill up to 310.5 bats per year. If the current proposed turbine amounts remain for the two proposed wind projects, then Baron Winds with a proposed 76 turbines would kill up to 874 bats per year and Canisteo Wind with a proposed maximum of 140 turbines would kill up to 1,610 bats per year. In total these active and proposed local wind projects, including this Project, would kill up to 3,864 bats per year. Conclusively, this Project would contribute to only 9.22 percent of the total annual bat mortality witnessed at these locally proposed and active wind projects.

When applying the total proposed local take of bats species annually of 3,864 bats to the assumed state annual average of 12,700 bats killed annually by 2019, the three active wind generating facilities (Howard, Marsh Hill, and Cohocton) already contribute to the assumed statewide take of 12,700 bats per year (by the year 2019). The Project, along with the proposed Canisteo Wind and Baron Winds projects, would contribute up to the mortality of an additional 2,840.5 bats per year increasing the statewide annual average by 22.36% and the total annual bats killed by turbines state wide to 15,540.5 bats. As a result, this Project, with an assumed annual take of 356.5 bats would equate to contributing only 2.29% mortality to this new state average.

(3) Impacts to Wildlife Travel Corridors

Wildlife travel corridors are areas of habitat which help to connect wildlife populations separated by encroaching human activities and structures. These corridors are vital to the overall health of wildlife populations as they facilitate the exchange of individuals between separate populations which in turn counteracts the harmful effects of inbreeding and also the overall isolation of populations. Wildlife travel corridors may also aide in the reestablishment of dwindling or extirpated populations, which may have been reduced due to natural and man-made impacts. In short, wildlife travel corridors help to counteract the adverse effects of habitat fragmentation, which causes wildlife to lose natural habitat and also the ability to move between regions and utilize available resources needed to survive.

There are no state or federally mapped wildlife travel corridors within the Project Area. However, migratory bird species do utilize the Project Area during transition periods between seasonal habitats as part of cyclical lifestyles. The routes followed by migratory birds are variable and nuances can be species-specific. Some of them are simple routes and can be easily mapped, while others are extremely complicated and vary annually based off of a myriad of route conditions. Bird migration is generally referenced as a north-and-south movement. Routes of heavier concentration tend to follow the coasts, mountain ranges and principal river valleys.

When defining avian migration routes, flyways are a term used to describe broad regional areas where a collection of migration routes are associated in a definite geographic region. There are four major North American migration flyways. They are named based off of their general geographic location and they are the Atlantic, the Mississippi, the Central and the Pacific Flyways. In reference to the Project, the Atlantic Flyway is the closest migration route to the Project Area. Moving southeastward, the flyway originates in the Arctic Coast of Alaska and cuts across the prairie provinces of Canada and the Northwest Territories cresting south through northern West Virginia and northeastern Ohio, and continues in this direction to the warm waters of the South Atlantic Coast and the Caribbean. This particular flyway is generally bounded by the Atlantic Coast of North America to the east and the Appalachian Mountains to the west. The Project Area resides within the foothills of the Allegheny Mountains along the border of New York and Pennsylvania. The Project would be at the extreme northern fringe of this flyway as it crests south traveling through northern West Virginia and northeastern Ohio. As such, this Project is not anticipated to have adverse impacts to continental-scale fly-ways or national migration corridors in general.

Small scale travel corridors to facilitate local movements of wildlife, including reptile and amphibian pathways for breeding, mammalian trails, and large patches of undisturbed forestland exist within the Project Area. Through specific siting of Project components, impacts to large forested areas within the Project Area have been minimized to the maximum extent practicable. Construction and operation of the Project will have minor impacts to these small scale travel corridors. Project components have been carefully sited to predominately occur along the edges of agricultural fields and forested communities where anthropomorphic disturbances already occur. It is presumed that wildlife travel corridors throughout these areas are limited. Moreover, associated forest communities are not unique to the region. As such, impacted forested areas will likely cause wildlife which prefer to traverse through forested communities to seek adjacent similar habitats, which will be readily available. Most impacted forested areas will also still be able to provide wildlife conveyance after the construction phase of the Project and so common species will be able to utilize existing travel corridors across breaks in canopy coverage. The impacts to major and minor wildlife travel corridors are expected to be negligible for this Project.

(4) Impacts to State and Federally-listed Species

Based on Project-specific information received from the New York Natural Heritage Program (NYNHP), NYSDEC, USFWS, and direct on-site observations, a list of state and federally-listed species was compiled which are believed to occur, or have the potential to occur, within the Project Area. Site-specific information requests to state and federal agencies were made in order to determine the presence of rare, threatened, endangered, and special concern species (see Appendix 22-11). Similarly, a list of species encountered during on-site survey work was documented by field staff. Any species which was visually identified on-site and also on the aforementioned state or federal registry was also included in the list of state and federally-listed species occurring within the Project Area. A summary impact table containing information on all listed species identified through the above-mentioned procedures was also compiled. The list contains a brief description of the specific habitat requirements for each identified species, the approximated source whereby each species is known to potentially occur within the vicinity of the Project, and if each species was directly observed on-site.

Initial contact with the USFWS was made to discuss conservation measures and evaluate potential impacts to species identified within the Project Area. The USFWS Information for Planning and Conservation (IPaC) resource was used to identify any threatened or endangered species, critical habitats, migratory birds or other natural resources that may be located within the vicinity of the Project Area. The USFWS IPaC Trust Resource Report listed one (1) species that may be located within the vicinity of the Project, which was the northern long-eared bat (*Myotis septentrionalis*) (Appendix 22-11). The northern long-eared bat is both a state and federally-listed threatened species.

Regarding inquiry to state databases, the NYSDEC Environmental Resource Mapper was consulted as a first step in determining the presence of rare or state-listed animals or plants, significant natural communities, or other significant habitats in the immediate vicinity of the Project. The results of the search revealed no potential presence of "Rare Plants and Rare Animals" in the surrounding area of the Project. However, through direct consultation with the New York Natural Heritage Program (NYNHP), it was determined that five state-listed species have been documented to be within the vicinity of the Project Area. The species include one mammal: the northern long-eared bat, and four avian species: Henslow's sparrow (*Ammodramus henslowii*), bald eagle (*Haliaeetus leucocephalus*), northern harrier (*Circus cyaneus*), and the pied-billed grebe (*Podilymbus podiceps*). These species are all state-listed as threatened in New York State. Additionally, the golden eagle (*Aquila chrysaetos*), a state-listed endangered raptor, was visually documented on-site by field staff. As such, it was also included in the documentation and impact avoidance strategies are described within the Application.

The NYSDEC also keeps records on species of special concern (SSC). These species are not listed as endangered or threatened, but are native New York species for which a welfare concern or risk of endangerment has been documented in the State (NYSDEC, 2017). Species of special concern were identified either through the aforementioned correspondence with NYNHP or also through direct observation on-site. One species, the eastern small-footed myotis (*Myotis leibii*), was listed through NYNHP to occur within the vicinity of the Project Area. All other species of special concern identified herein were observed through aforementioned field survey work.

Furthermore, the NYSDEC also maintains a list of species deemed to be in need of conservation measures more readily than other native species due to contemporary increases in rates of population decline (NYSDEC, 2017). The USFWS State Wildlife Grant Program (SWG) provides Federal grant funds to State fish and wildlife agencies for developing and implementing programs that benefit wildlife and their habitats, including species that are not hunted or fished. Allocations to New York were utilized to support the goals and priority conservation actions outlined in New York's State Wildlife Action Plan, technically termed the *Comprehensive Wildlife Conservation Strategy* (CWCS). It is believed that mitigating the decline of species reduces the potential for these species to be listed as threatened or endangered in the future. This conservation approach was taken by New York State as a pre-emptive attempt in preserving at-risk species.

In order to access these grant funds, New York State was required to develop a CWCS that focuses on the listing of particular Species of Greatest Conservation Need (SGCN). This list of SGCN includes species that are rare or declining and is structured by a priority index which divides the list into three main groupings. The first group are Species of Greatest Conservation Need – High Priority (SGCN-HP). The 'High Priority' listing indicates that species are declining at a rate where conservation is needed within

the next ten years to mitigate future imperilment and critical population levels in New York. The second listing are Species of Greatest Conservation Need (SGCN). The current status of these species is known and species are experiencing a moderate rate of population decline. Specific threats to the species have been identified and there is a need for conservation actions to maintain stable population levels or facilitate a recovery of population levels. The third category is Species of Potential Conservation Need (SPCN). These are species whose status is poorly known, but there is an identified threat to the species, or features of its life history that make it particularly vulnerable to threats. This species may be declining or will potentially begin to experience dramatic declines within the next ten years. However, these species require further studies to determine their actual status.

Many of the species listed as threatened, endangered, or of special concern are also identified as SGCN. Additional to the aforementioned state-listed species (threatened, endangered, or of special concern), a total of 22 other species are also documented to occur within the Project Area which are listed as SGCN or SGCN-HP. See Table 22-10 below for a summary impact table containing information on all listed species identified.

Table 22-10. State and Federally-listed Species Occurring or Likely to Occur within the Project Area

Species Name	Federal Status[1]	NYS Status[2]	SGCN Listing[3]	Habitat Preference	Recorded Source[4]	Observed On-site
Golden Eagle *Aquila chrysaetos*	N/A	END	SGCN	This species prefers remote mountainous areas with open habitat and exposed cliff face for nesting. Open areas are described as grasslands, successional old-field and scrublands. This species was documented visually and is believed to transiently utilize steep slope and open area habitats in the Project Area.	FO	Yes
Northern Long-Eared Bat *Myotis septentrionalis*	THR	THR	SGCN-HP	This species is primarily a forest-dependent insectivore which utilizes tree cavities or loose bark of trees for roosting, foraging and raising young. This species hibernates through the late fall and early spring in caves or abandoned mines. Suitable summer roost habitat within the forested portions of the Project Area. Species was noted to be potentially present on-site through Rare Bat Acoustic Survey conducted by Stantec.	FO, USFWS, NHP	Yes
Henslow's Sparrow *Ammodramus henslowii*	N/A	THR	SGCN-HP	This species habitat consists of moist fallow fields and meadows. Breeding occurs in a variety of habitats with tall, dense grass and herbaceous vegetation. Suitable habitat in the Project Area in the form of old fields and lightly grazed pastures.	NHP	No
Bald Eagle *Haliaeetus leucocephalus*	N/A	THR	SGCN	This species prefers undisturbed areas near large lakes, reservoirs, marshes, swamps, or stretches along rivers where they can breed and forage for fish. The presence of this species and active nesting sites were documented visually in close proximity to the Project Area. Species were observed during on-site survey work conducted by Stantec and TRC.	FO, NHP	Yes
Northern Harrier *Circus cyaneus*	N/A	THR	SGCN	This species prefers agricultural fields, successional grasslands, and emergent marshes. Breeding occurs in more successional scrubland habitats. Suitable habitat occurs within the Project Area. Species were observed during on-site avian survey work conducted by Stantec.	FO, NHP	Yes
Pied-billed Grebe *Podilymbus podiceps*	N/A	THR	SGCN	This species prefers to breed on seasonal and permanent open water bodies. Breeding preferences require dense stands of deep water emergent vegetation for nesting and cover that are situated close to open water which is used for foraging. Suitable habitat occurs within the Project Area.	NHP	No

Species Name	Federal Status[1]	NYS Status[2]	SGCN Listing[3]	Habitat Preference	Recorded Source[4]	Observed On-site
Eastern Small-Footed Myotis *Myotis leibii*	N/A	SSC	SGCN	This species prefers summer roosts in fractures in rock ledges and talus slopes areas. This species has been documented to minimally use forested habitats as well. This species hibernates through the late fall and early spring in caves or abandoned mines. Suitable summer roost habitat within the forested portions of the Project Area. Species was noted to be potentially present on-site through Rare Bat Acoustic Survey conducted by Stantec.	FO, NHP	Yes
Cooper's Hawk *Accipiter cooperii*	N/A	SSC	N/A	This species prefers to reside in deciduous, mixed, and coniferous forests. Suitable habitat for this species occurs within the Project Area. Species were observed during on-site avian survey work conducted by Stantec.	FO	Yes
Northern Goshawk *Accipiter gentilis*	N/A	SSC	SGCN	This species prefers larger tracts of wild forest. Across much of their range they live mainly in coniferous forests, but may occur in deciduous hardwood forest as well. Suitable habitat for this species occurs within the Project Area. Species were observed during on-site avian survey work conducted by Stantec.	FO	Yes
Osprey *Pandion haliaetus*	N/A	SSC	N/A	Prefers open water habitat for nesting and foraging, including marshlands, rivers, ponds, reservoirs, estuaries, and lakes. Suitable habitat for this species occurs within the Project Area. Species were observed during on-site avian survey work conducted by Stantec.	FO	Yes
Red-Shouldered Hawk *Buteo lineatus*	N/A	SSC	SGCN	This species prefers forested areas with wetland complexes such as swamps and forested wetlands. Suitable habitat for this species occurs within the Project Area. Species were observed during on-site avian survey work conducted by Stantec.	FO	Yes
Sharp-Shinned Hawk *Accipiter striatus*	N/A	SSC	N/A	This forest-dwelling raptor prefers to reside in deciduous forests and mixed woodlands. Suitable habitat for this species occurs within the Project Area. Species were observed during on-site avian survey work conducted by Stantec.	FO	Yes
Vesper Sparrow *Pooecetes gramineus*	N/A	SSC	SGCN-HP	This species responds quickly to changes in habitat and often occupies abandoned old farm fields and successional shrub lands as they return to forest. Areas with this character are present in the Project Area. Species were not observed on site however, habitat preferences do occur within the Project Area.	NYSDEC	No

Species Name	Federal Status[1]	NYS Status[2]	SGCN Listing[3]	Habitat Preference	Recorded Source[4]	Observed On-site
Grasshopper Sparrow *Ammodramus savannarum*	N/A	SSC	SGCN-HP	This species prefers open fields and prairie including active hay fields, old field, and minimally in successional shrublands. Suitable habitat for this species occurs within the Project Area. Species were observed during on-site avian survey work conducted by Stantec.	FO	Yes
Great Blue Heron *Ardea herodias*	N/A	PRO	N/A	This species prefers wetland habitats, including marshes, riverbanks, lakes, and ponds. They have also been known to forage in grasslands and agricultural fields. Suitable habitat for this species occurs within the Project Area. Species were observed during on-site survey work conducted by TRC.	FO	Yes
Little Brown Myotis *Myotis lucifugus*	N/A	N/A	SGCN-HP	This species prefers summer roosts in buildings or trees, under rocks or wood piles. This species hibernates through the late fall and early spring in caves or abandoned mines. Suitable summer roost habitat within the forested portions of the Project Area. This species was noted to be potentially present on-site through Rare Bat Acoustic Survey conducted by Stantec.	FO	Yes
Tri-colored Bat *Perimyotis subflavus*	N/A	N/A	SGCN-HP	This species prefers summer roosting in trees and utilize cavities or loose bark of forests for roosting, foraging and raising young. This species hibernates through the late fall and early spring in caves or abandoned mines. Suitable summer roost habitat within the forested portions of the Project Area. Species was noted to be potentially present on-site through Rare Bat Acoustic Survey conducted by Stantec.	FO	Yes
Bobolink *Dolichonyx oryzivorus*	N/A	N/A	SGCN-HP	This species prefers grasslands, including pastures, old fields, and meadows. Suitable habitat for this species occurs within the Project Area. Species were observed during on-site avian survey work conducted by Stantec.	FO	Yes
Brown Thrasher *Toxostoma rufum*	N/A	N/A	SGCN-HP	This species prefers shrublands, dense regenerating woods, and forest edges. Suitable habitat for this species occurs within the Project Area. Species were observed during on-site avian survey work conducted by Stantec.	FO	Yes

Species Name	Federal Status[1]	NYS Status[2]	SGCN Listing[3]	Habitat Preference	Recorded Source[4]	Observed On-site
Canada Warbler *Cardellina canadensis*	N/A	N/A	SGCN-HP	This species prefers forest undergrowth and shady thickets. Breeding occurs in mixed hardwoods of extensive forests and streamside thickets and nesting occurs near moist habitat. Suitable habitat for this species occurs within the Project Area. Species were observed during on-site avian survey work conducted by Stantec.	FO	Yes
Cape May Warbler *Setophaga tigrina*	N/A	N/A	SGCN-HP	This species prefers spruce forest either pure stands or fir-mixed canopies residing in open woods or near the forest edge. Suitable habitat for this species occurs within the Project Area. Species were observed during on-site avian survey work conducted by Stantec.	FO	Yes
Eastern Meadowlark *Sturnella magna*	N/A	N/A	SGCN-HP	This species prefers farm fields, grasslands, and wet fields. They nest on the ground and sing from exposed perches. Suitable habitat for this species occurs within the Project Area. Species were observed during on-site avian survey work conducted by Stantec.	FO	Yes
Olive-Sided Flycatcher *Contopus cooperi*	N/A	N/A	SGCN-HP	This species prefers conifer forests with open clearings. Breeding occurs along the edges of open areas, including bogs, ponds, and clearings. Suitable habitat for this species occurs within the Project Area. Species were observed during on-site avian survey work conducted by Stantec.	FO	Yes
Hoary Bat *Lasiurus cinereus*	N/A	N/A	SGCN	This species prefers to roost in dense woodland areas, mainly coniferous forests and forages over open areas or large open bodies of water. Suitable habitat occurs within the Project Area. This species was noted to be potentially present on-site through Rare Bat Acoustic Survey conducted by Stantec.	FO	Yes
Eastern red bat *Lasiurus borealis*	N/A	N/A	SGCN	This is a migratory bat species that often resides in forested areas and does not overwinter in caves. Suitable habitat occurs within the forested portions of the Project Area. Species was noted to be potentially present on-site through Rare Bat Acoustic Survey conducted by Stantec.	FO	Yes

Species Name	Federal Status[1]	NYS Status[2]	SGCN Listing[3]	Habitat Preference	Recorded Source[4]	Observed On-site
Silver-haired bat *Lasionycteris noctivagans*	N/A	N/A	SGCN	This migratory bat species prefers roosts in deciduous and mixed forests, often near water. Roost in bark crevices and hollows. Suitable habitat within the forested portions of the Project Area. Species was noted to be potentially present on-site through Rare Bat Acoustic Survey conducted by Stantec.	FO	Yes
American Kestrel *Falco sparverius*	N/A	N/A	SGCN	This species prefers open areas, such as successional old fields, forest edges, scrublands, and hay fields. Suitable habitat for this species occurs within the Project Area. Species were observed during on-site avian survey work conducted by Stantec.	FO	Yes
Black-Billed Cuckoo *Coccyzus erythropthalmus*	N/A	N/A	SGCN	This species prefers forest edges, groves, thickets. Breeds mostly in deciduous or mixed growth thickets. Suitable habitat for this species occurs within the Project Area. Species were observed during on-site avian survey work conducted by Stantec.	FO	Yes
Black-Throated Blue Warbler *Setophaga caerulescens*	N/A	N/A	SGCN	This species prefers the dense shrubby interior of hardwood and mixed deciduous-coniferous forests. Suitable habitat for this species occurs within the Project Area. Species were observed during on-site avian survey work conducted by Stantec.	FO	Yes
Blue-Winged Warbler *Vermivora cyanoptera*	N/A	N/A	SGCN	This species prefers brushy hillsides, bogs, overgrown pastures, and stream and woodland edges. Breeds in dry uplands in low shrublands. Suitable habitat for this species occurs within the Project Area. Species were observed during on-site avian survey work conducted by Stantec.	FO	Yes
Prairie Warbler *Setophaga discolor*	N/A	N/A	SGCN	This species prefers successional shrubland, successional old-field, brush piles, and pastures. Breeds in dry old field and clearing, edges of forest, and sandy pine barrens. Suitable habitat for this species occurs within the Project Area. Species were observed during on-site avian survey work conducted by Stantec	FO	Yes
Ruffed Grouse *Bonasa umbellus*	N/A	N/A	SGCN	This species prefers rich forest interior with scattered clearings, but may also be found in successional forests after disturbances. Suitable habitat for this species occurs within the Project Area. Species were observed during on-site avian survey work conducted by Stantec.	FO	Yes

Species Name	Federal Status[1]	NYS Status[2]	SGCN Listing[3]	Habitat Preference	Recorded Source[4]	Observed On-site
Scarlet Tanager *Piranga olivacea*	N/A	N/A	SGCN	This species prefers to reside in deciduous and mixed forest canopies. Suitable habitat for this species occurs within the Project Area. Species were observed during on-site avian survey work conducted by Stantec.	FO	Yes
Wood Thrush *Hylocichla mustelina*	N/A	N/A	SGCN	This species prefers deciduous and mixed forests with large trees, moderate understory, shade, and abundant leaf litter. Suitable habitat for this species occurs within the Project Area. Species were observed during on-site avian survey work conducted by Stantec.	FO	Yes
Shorthead garter snake *Thamnophis brachystoma*	N/A	N/A	SGCN	This species prefers old fields, meadows, pastures, forest edges, and other open herbaceous fields, often in areas close to water or wetlands. Suitable habitat for this species occurs within the Project Area. Based off of HerpAtlas data sets provided by the NYSDEC, this species has the potential to occur within the Project Area.	NYSDEC	No
Smooth green snake *Liochlorophis vernalis*	N/A	N/A	SGCN	This species prefers marshes, meadows, the edges of streams, and open forestland. It prefers to be on the ground, in open areas without dense shrubbery. Suitable habitat for this species occurs within the Project Area. Species were observed during on-site survey work conducted by TRC.	FO, NYSDEC	Yes
Tennessee Warbler *Oreothlypis peregrina*	N/A	N/A	SGCN	This species prefers deciduous and mixed forest successional shrub lands and forest edges. Suitable habitat for this species occurs within the Project Area. Species were observed during on-site avian survey work conducted by Stantec.	FO	Yes

1 - 'Federal Status' refers to the species listing as federally endangered (END) OR threatened (THR).

2 - 'NYS Status' refers to the species listing as a state-listed endangered (END) or threatened (THR) species.

3- 'SGCN Listing' refers to is the species is state listed as a Species of Greatest Conservation Need – High Priority (SGCN-HP), Species of Greatest Conservation Need (SGCN), or a Species of Potential Conservation Need (SPCN).

4- 'Recorded Source' indicates how the species was documented as occurring within the Project Area. Documentation occurred through correspondence with the USFWS, NYSDEC or NYNHP or through field observations (FO) by contracted field survey biologists.

Impacts to Rare or Special Status Plants and Significant Ecological Communities

There are no state or federally-listed endangered, threatened, candidate, or rare plant species identified within the Project Area through agency correspondence, including USFWS IPaC results or the NYNHP response letter, nor were any observed on-site during survey operations. Correspondingly, significant ecological communities were also not identified to occur within the Project Area through agency correspondence or on-site observations. As such, Project construction and operation will not adversely impact any rare or protected plants or impact any significant ecological communities.

Impacts to Special Status Mammals

Listed mammalian species which were documented to potentially occur within the Project Area include the state and federally-listed threatened northern long-eared bat (NLEB) and the state-listed species of special concern, the eastern small-footed myotis (ESFM). Both listed species can be found inhabiting forested areas throughout the northeast during spring, summer, and fall. These species also share similar habitat preferences in the winter months as they hibernate in caves and abandoned mines. Forested habitats within the Project Area could provide summer roosting and foraging habitat for both species. Although the eastern small-footed bats have been known to roost in forested areas in the summer months and in caves and mines in the winter months, it is believed that the species' preferred roosting habitat (and potential winter hibernation habitat) are rocky outcrops or talus slopes. These species were documented as potentially occurring on-site through USFWS (NLEB) and NYNHP (NLEB and ESFM) correspondence. Correspondingly, pre-construction acoustic survey of rare bats detected the potential presence of both species at low-levels within the Project Area and also mist-netting operations in select locations collected individuals from both species in the summer of 2017.

Potential impacts to these bat species during the construction phase could include direct mortality and also a loss of foraging/roosting habitat through the clearing of forestland for the placement of Project components. During the operational phase of the Project, direct impact to these species could result from turbine-related impact and resulting mortality.

Avoidance of direct mortality of these bat species during the construction phase of the Project will occur by coordinating the clearing of forested areas between October 1 and May 1, outside of the breeding periods for these species, and during their hibernation cycle with species relocated to caves, steep talus slopes, or abandoned mines. Impacts to these species during the operation phase of the Project will be limited. The USFWS has concluded that NLEB mortality at wind farms do not pose a significant amount of risk to the species (USFWS, 2015). Reduced impact to these species can also arise from voluntary industry BMPs establishing the voluntary operating protocol of feathering turbines below normal cut-in speed (USFWS, 2016) and other deterrence research currently under development. The designation of curtailment regimes to increase cut-in speeds of turbines at specific periods and temperature during the operation phase of the Project is also currently being pursued. Specific design and regime of curtailment for the Project will be developed and discussed in detail with the applicable state agencies confidentially.

To understand in more detail the potential impacts to the NLEB and ESFM, see discussions on specific bat mortality rates for the Project conducted by Stantec (see Appendix 22-10 and associated summaries in sections above).

Impacts to Mammals of Greatest Conservation Need

During the rare bat acoustic survey conducted by Stantec, the little brown myotis, tri-colored bat, hoary bat, eastern red bat, and silver-haired bat, were positively identified on-site during the acoustic surveys. These species are all indicated as being species of greatest conservation need (SGCN) by New York State. Given that tree clearing operations will take place between October 1 and May 1, forested communities will be impacted outside of the breeding and activity periods for these species. As such, construction related impacts to these species will be limited. During the operation phase of the Project, instances with turbine collision could result in direct mortality to these species. The Applicant has developed preliminary avoidance, minimization, and mitigation measures, which will aid in the reduction of operational related impact to these species. Please see 22(g) below on plans to minimize and mitigate impacts to bats during construction and operation phases of this Project. The construction and operational phases of this Project will not have a significant effect on statewide or range wide populations, as these species have population numbers statewide that are more stable than species listed under one of the federal or state protection statuses.

Impacts to Special Status Avian Species

Pre-construction Avian Survey

Through correspondence with the USFWS, no federally endangered or threatened avian species were documented within the Project Area. However, several state-listed bird species were documented to occur within the Project Area. These species were identified through NYSDEC and NYNHP correspondence and a majority of species were also verified through on-site survey work. State-listed species which were determined to potentially occur within the Project Area include the golden eagle (endangered), bald eagle (threatened), northern harrier (threatened), Henslow's sparrow (threatened), pied-billed grebe (threatened), Cooper's hawk (special concern), northern goshawk (special concern), osprey (special concern), red-shouldered hawk (special concern), sharp-shinned hawk (special concern), and the grasshopper sparrow (special concern).

Henslow's sparrow and the pied-billed grebe were both documented as potentially occurring within the Project Area through NHP correspondence but were not verified by on-site bird survey work. Impacts to these species are anticipated to be low or nonexistent due to the potential for these listed birds to not utilize habitat the Project Area at all, or so intermittently as to not be detected during on-site surveys approved by state and federal agencies. However, quality habitat occurs within the Project Area for both species. As such, consideration is given to the impact of habitats within the Project Area which could be utilized by both species.

Eagle activity in the vicinity of the Project Area was documented during on site survey work conducted by Stantec. Out of a total of 16,620 survey effort minutes, biologists recorded 176 total eagle minutes and 96 exposure-minutes in the approximate rotor-swept zone of the turbines. The total eagle passage

rate (eagle minutes per minute of survey) was 0.0347. The eagle passage rate for eagle minutes observed in the survey areas and in the approximate rotor-swept zone was 0.0209. Although eagle presence is documented within the Project Area and active nest sites are located in close proximity to the Project Area, eagle activity near turbine locations appear to be limited. The behaviors of individual eagles observed were also not behaviors that are thought to be associated with greater collision risk at wind projects (e.g., courtship, territorial displays, or foraging). Some open waterbody features, including NYSDEC freshwater state wetland RX-2, which will be crossed by overhead collection line, occur in the Project Area and these features are likely to concentrate eagles or eagle foraging activity. Turbines have been sited away from open waterbodies within the Project Area initially in an effort to avoid impacts to NYSDEC freshwater wetlands. Correspondingly, the siting of turbines away from these open water areas will also reduce any adverse effect to the potential foraging habits of eagles within the Project Area.

The golden eagle, a state endangered eagle species, were observed during the raptor and eagle point count surveys conducted at the Project. There were three individuals observed: one on 3 March, one on 22 March, and one on 1 June 2016 at three different survey locations—one of these locations is within the current Project boundary. Two of the individuals were observed flying and one individual was observed perched then flying. This species is a migrant in the region and its preferred nesting habitat is exposed cliffs in montane regions which is not available at the Project. Golden eagles do not breed in the area but may stopover during migration or overwinter in the area and may forage in available open areas.

Most of the bald eagle observations occurred in October 2016 within the southern portion of the Project Area (Stantec, 2017). There are no occupied bald eagle nests within the Project Area. The nearest occupied bald eagle nest is located along Bennetts Creek, approximately 2.5 miles (4 km) northeast of the current Project boundary (Stantec, 2017). Bald eagles are anticipated to be present in the area year-round to forage, primarily in the open areas along rivers or sizable bodies of water or while traveling to foraging locations.

The state threatened northern harrier was observed during on-site field surveys (fall migration and raptor and eagle point counts). There were 25 individuals observed at 10 eagle/raptor point count locations and 2 migration transects—3 of these locations are within the current Project boundary. Northern harrier were observed during the months of March through June and August through November 2016 and March 2017. Its preferred habitats of fields, emergent wetlands, successional scrublands, and field edges occur in the Project Area and the species could occur in the area year-round as either a local or migrant.

The red-shouldered hawk, a state special concern species, was observed during on-site field surveys including the breeding bird survey. Eight individuals were observed at three raptor/eagle point count locations and two breeding bird/migration transects—one of these locations is within the current Project Area. Red-shouldered hawks were observed during the months of March, April, June, and November 2016 and March 2017. Its preferred habitat of swamps and forested wetlands occurs on-site and the species may also occur in the region as a migrant.

Three state special concern accipiter species—northern goshawk, Cooper's hawk, and sharp-shinned hawk—were documented during on-site field surveys conducted during migration but not during the

breeding bird survey. Twenty-eight observations of these 3 species combined were observed at 12 raptor/eagle point count locations, and 5 migration transects—4 of these locations are within the current Project Area. Accipiters were observed during the months of March through June, August through October 2016 and January and March through May 2017. Cooper's hawk and sharp-shinned hawk breed in forest and forest edge, which occur in the Project Area; however, the preferred breeding habitat of northern goshawk, which includes large tracts of mature coniferous forest, does not occur in the Project Area. All three species could occur in the area during migration.

The state special concern osprey was observed on-site during the raptor and eagle point count survey and the spring migration survey. Three individuals were observed at two raptor/eagle point count locations and one migration transect — one of these locations is within the current Project Area (see Appendix 22-5). Ospreys were observed on April 13 and September 27, 2016 and May 3, 2017. Its preferred habitat of tall trees or other structures adjacent to open water (Wheeler 2003) occurs in the area but no nests were documented during the breeding survey or aerial nest survey, so it is unlikely that this species breeds in the Project Area. This species may fly over the Project Area during migration or while traveling between foraging locations during the breeding season.

Construction impacts as a result of the Project would occur primarily during forest clearing required for access roads, collection line, and turbine placement. Forest clearing will be conducted between October 1 and May 1, which is outside of the nesting period for most raptor species, minimizing or avoiding potential direct impacts to threatened and endangered raptor species. Forest fragmentation effects as a result of Project operation is described in more detail in section *22(f)(2) Operation Related Impacts to Vegetation, Wildlife, and Wildlife Habitat*.

The grasshopper sparrow, a state special concern species, nests in hayfields, old field, and early successional shrubland. These habitats occur in the Project Area, and the species was documented during on-site field surveys including the breeding bird survey. Thirty-one individuals were observed during the months of May through July 2016 and May 2017. Grasshopper sparrows were observed at one raptor/eagle point count location and three breeding bird/migration transects—two of these locations are within the current Project boundary. Grasshopper sparrow would also occur in the region during migration.

Avian and Bat Habitat Assessment

Stantec performed an assessment of existing bird and bat habitat at the Eight Point Wind Energy Center. This effort was primarily a desktop review of available information but also included results of Stantec's 2016 and 2017 field surveys at the Project.

The purpose of this assessment was to identify habitats present and rare species of birds or bats occurring in the Project area or with potential to occur in the Project area based on their ranges, habitat preferences, and information provided by the US Fish and Wildlife Service (USFWS), the New York State Department of Conservation (NYSDEC), and the New York Natural Heritage Program (NYNHP). Rare species were considered federally or state endangered or threatened species, state special concern species, and state designated species of greatest conservation need.

Stantec evaluated habitat and took photographs of available habitats on-site during multiple field surveys. Stantec reviewed National Land Cover Data to classify land cover types in the Project Area. Stantec reviewed field data and land cover types to determine if there was the potential to support rare species in the Project area. Field surveys were conducted in a variety of habitats that were representative of all of the habitats that occur on-site and the surrounding area. Results of field surveys completed to-date were integrated into Stantec's assessment to document the occurrence of state or federally listed species or SGCN within the Project Area. Associated field surveys conducted between spring 2016 and fall 2017 include:

- Eagle Point Count and Raptor Migration Surveys (Year 1: March 2016 – February 2017; Year 2: May 2017 – currently ongoing into May 2018)
- Aerial Bald Eagle Nest Survey (June 2016)
- Breeding Bird Surveys (May – July 2016)
- Fall Migration Bird Surveys (August – October 2016)
- Presence/absence acoustic bat survey (July – August 2016)
- Spring Migration Bird Survey (March – May 2017)
- Bat Mist Net and Acoustic Survey (August 2017)

In addition, information from USFWS and NYSDEC representatives considered for Stantec's assessment were obtained during the following Project meetings:

- 11 February 2016, NYSDEC Central Office
- 6 April 2016, conference call with USFWS and NYSDEC
- 28 November 2016, conference call with NYSDEC
- 29 November 2016, conference call with USFWS

Initial consultation information from NYNHP and the USFWS Information Planning and Conservation (IPaC) website was obtained in 2016.

In relation to avian species, information from agencies and field surveys indicated the occurrence or potential occurrence of 24 bird species designated as SGCN and three (3) additional species of general conservation concern. One of these SGCN is state-listed as state endangered, while four (4) are state threatened, and seven (7) are state special concern. No species were federally endangered or threatened.

In relation to bat species, information from agencies and field surveys indicated the occurrence or potential occurrence of seven (7) bat species designated as SGCN in the Project Area or surrounding area. One of these SGCN is also federally and state threatened and one is state special concern.

All avian and bat species listed in Stantec's habitat assessment can be reviewed in detail in the above mentioned Table 22-10.

Stantec affirms that habitats in the Project Area provide suitable habitat for several bird and bat species of conservation concern. Stantec did not document federally endangered or threatened bird species or federally endangered bat species or their habitats on-site. There was one state endangered (golden eagle) and two state threatened bird species (bald eagle and northern harrier) and one state threatened bat species (northern long-eared bat) documented on-site during field surveys.

Rare species are more susceptible to impacts associated with loss of habitat and/or changes in seasonal behavior due to disturbances. Many species of grassland birds such as the bobolink (*Dolichonyx oryzivorus*) and eastern meadowlark (*Sturnella magna*) are at risk due to declining habitat in the region and their distribution in the region is largely related to landowner management practices. Rare bats, including northern long-eared bat, are susceptible to loss of forest roosting habitat particularly during the summer breeding period. Forest interior species such as Canada warbler (*Cardellina canadensis*) and black-billed cuckoo (*Coccyzus erythropthalmus*) are susceptible to edge effects including decreased foraging opportunities and increased predation. Operation of the Project will pose collision risk to migratory birds and bats, potentially including rare species. There are no known bald eagle nests in the current Project area; however, there is a potential risk of collision for eagles that may fly over the Project area. Raptor collisions at operational projects in the east occur less frequently than nocturnal migrant songbird collisions (Stantec, 2017). There have been only a few bald eagle fatalities reported at operational facilities in the east (Stantec, 2017).

Based on Stantec's findings, construction and operation of the Project is not expected to significantly impact the suitability of available habitats for birds or bats, or result in the loss of sensitive or unique habitats that rare species rely on. The habitats present are common and widespread in the region and are not unique to the Project Area. The footprint of Project infrastructure within the Project boundary is relatively small and most of the turbines will be located in previously disturbed areas or on the edges of active agricultural fields.

For a more detailed review of Stantec's Habitat Assessment Report please refer to Appendix 22-8.

Impacts to Avian Species of Greatest Conservation Need

A total of 15 avian species solely listed (those not listed as threatened, endangered, or of special concern) with SGCN status were observed during on-site surveys conducted by TRC and Stantec. These species are:

- Bobolink
- Brown Thrasher
- Canada Warbler
- Cape May Warbler
- Eastern Meadowlark
- Olive-Sided Flycatcher
- American Kestrel
- Black-Billed Cuckoo
- Black-Throated Blue Warbler
- Blue-Winged Warbler
- Prairie Warbler
- Ruffed Grouse
- Scarlet Tanager
- Wood Thrush
- Tennessee Warbler

Although Project construction and operation phases could have an adverse impact on individuals of these species, suitable habitat is abundant within the Project Area. The Project Area will not result in the removal or severe impact to any specific habitat. Likewise, these species are not listed as threatened or endangered, or of special concern. Although population numbers may be decreasing at a faster rate statewide, there are still more robust population numbers than those specific species which are listed under one of these protection statuses (i.e., endangered, threatened, or special concern). Due to the larger population size and the limited impact to preferred habitat by these individual species Project construction or operation phases will not have a significant effect on regional, statewide, or range wide populations of these species.

Impacts to Special Status Amphibians and Reptiles

Two reptile species, the shorthead garter snake and the smooth green snake, are listed as SGCN and are documented by the NYSDEC HerpAtlas program as having the potential to occur within the Project Area. The smooth green snake was also documented by TRC field crews conducting routine wetland survey operations for the Project. The short-headed garter snake is commonly found in old fields and meadows, but can occasionally be found in wooded areas which are in close proximity to fields, which this species will utilize for basking and foraging. The smooth green snake can be found in many different habitats, including emergent wetlands, successional old fields, meadows, the edges of streams, and open forestland. This species also prefers open habitats for basking purposes and will select moist habitat with lush green foliage for camouflage purposes.

These species can occur throughout the Project Area, including in areas that might be disturbed during construction. As stated previously for other SGCN species, although population numbers may be decreasing at faster rate statewide, there are still more robust population numbers than those specific species which are listed under one of these protection statuses (i.e., endangered, threatened, or special concern). Construction operations could disperse local individuals and adversely impact habitat for this species. However, due to the larger regional population size, the evasive and transient nature of these snake species to avoid anthropogenic disturbances, and the wide-ranging habitat preferences for these species, it is not anticipated that Project construction or operation phases will have a significant effect on regional, statewide, or range wide populations.

22(g) Mitigation of Impacts to Wildlife and Wildlife Habitats

Discussion on mitigating the impact to plant communities within the Project Area can be reviewed in *22(c) Avoidance and Mitigation Measures for Vegetation Impacts*. Construction-related impacts to fish and wildlife will be limited to incidental injury and mortality due to construction activity. These activities include use of heavy machinery, vehicular traffic, and minimal silt and sedimentation events as a result of construction occurring within aquatic ecosystems. Also, habitat disturbance and loss will occur due to vegetation clearing, earth moving activities, and the placement of Project components. Displacement events will also occur due to increased noise, vibration, and human activities as a result of construction in previously undisturbed areas. The mitigation of these construction related impacts will be accomplished through continued careful site design. Site design practices adhere to utilizing existing roads for the siting of turbine access where available, avoiding sensitive habitats indicated through site survey and reconnaissance, siting turbines on the edges of agricultural fields and forests, minimizing

construction disturbances to the extent practicable, adherence to designated construction limits, and avoidance of off limit sensitive areas. In order to reduce impacts to birds and bats, the Applicant plans to conduct tree clearing between October 1 and May 1, when these wildlife species are not nesting or roosting in tree canopies.

In order to reduce impacts to aquatic resources as a result of construction-related siltation and sedimentation events, the Applicant will utilize an approved sediment and erosion control plan and implement a SWPPP for the construction phase of the Project. The sediment and erosion control plan and Preliminary SWPPP are described in more detail in Exhibit 23. Also, the Preliminary SWPPP is attached as Appendix 23-4, and a Spill Prevention, Containment and Counter Measures (SPCC) Plan has been developed for all NextEra projects in North America and will be similarly implemented at the Project to mitigate the spill of hazardous chemicals during the construction and operation phases of the Project. Further detail of the SPCC plan can be reviewed in Exhibit 23 and Appendix 23-5 of this Application.

Through initial impact analysis and careful site design, permanent habitat loss and forest fragmentation have been concentrated. As stated previously, a majority of access roads, collection lines, and turbine locations have been sited along the edges of agricultural fields and forest/shrub land in order to minimize impacts to each specific habitat and reduce the amount of fragmentation events in each vegetative community. Most forest or scrub-shrub areas which will be required to be cleared for Project related construction, will be allowed to regrow in the operation phase to pre-existing forest habitat or as a minimum shrub land habitat. Over time, the regeneration of this areas will begin to provide habitat for a majority of any displaced species or other species which prefer shrub land or forest land habitats.

The Project layout has also been designed to minimize bird and bat collision mortality events. In an effort to reduce avian and bat impacts, electrical collection lines between the turbines will reside underground for a vast majority of the Project. Only portions of the collection line which must span dramatic topographical constraints along New York State Route 248 in the Town of West Union will occur as overhead lines. Lighting of the turbines and other Project related infrastructure will occur at the minimal levels approved by the Federal Aviation Administration (FAA). The lighting pattern of these structures will adhere to specific design guidelines which will be implemented to reduce collision risk. See 22(h) Avian and Bat Impact Analysis, Monitoring, and Mitigation Program below for more details into the mitigation of avian and bat impact through post construction and operational guidelines and engagements which will be undertaken by the Applicant.

It is presumed that if all turbines in the Project were designs which produced 2.3 MW each, than a total of 44 individual turbines would be required to reach the desired energy output for the proposed energy center. With this Project design, the total swept area would be 465,005.992 m^2. However, in utilizing the proposed option of 31 turbines with a mixture of turbine designs which produce 2.3 and 3.4 MW, then the total swept area would be 440,284.000 m^2. It can be seen that by using the proposed option, the total swept area is reduced by a total of 24,721.992 m^2. Currently, there is conflicting conclusions in research on whether bird and bat collisions increase with tower height or rotor swept area on a per MW basis (Baerwald and Barclay 2009; Barclay et al. 2007; Arnett and Baerwald 2013). However, some research has noted that the swept area of rotors within a wind farm directly correlates with the potential for collisions and fatalities of local and migratory avian and bat species. It has been proposed

that larger rotor swept areas could in turn, increase the amount of probable collisions to local and migratory avian and bat species. With the utilization of larger turbines with larger energy output capacities, the total rotor swept area is greatly reduced for the Project with the reduction of individual turbine structures needed. As such, the potential for collisions to local and migratory avian and bat species is also correspondingly reduced.

22(h) Avian and Bat Impact Monitoring and Mitigation Program

(1) Identification, Evaluation, and Assessment of Direct and Indirect Impacts to Avian and Bat Species

Please see section 22(f) for more information regarding impacts to avian and bat species.

(2) Literature and Impact Analysis for Northern Long-eared Bat

Please see section 22(f) for more information regarding analysis for the threatened northern long-eared bat.

(3) Assessment of the Potential Population-level Effects on Bats from Wind-Energy Related Mortality

Please see section 22(f) for more information regarding potential population effects wind-energy related mortality may have on bats at a regional scale.

(4) Post-construction Operations Monitoring for Impacts to Avian and Bat Species and Supporting Habitats

As stated previously, numerous pre-construction avian and bat studies have been conducted, which were based on the NYSDEC's *Guidelines for Conducting Bird and Bat Studies at Commercial Wind Energy Projects* (Guidelines), revised June 2016. Copies of all reports prepared in accordance with this work plan were provided to NYSDEC personnel, and these reports are appended to this Article 10 Application. A comprehensive analysis of construction and operation-related impacts to birds and bats, as well as their habitats, as a result of the intended Project is provided in the sections above.

To further reduce Project related impacts to birds and bats, a Post-Construction Operations Monitoring program will be developed to assess and mitigate the direct and indirect impacts the Project may have on bird and bat species. The post-construction monitoring plan will include the following general protocols outlined in greater detail within the Guidelines mentioned above:

- Ground searches for bird and bat carcasses of selected turbines within the Project Area for an initial two years. Turbine searches, search area, ground cover documentation, search conditions, photographs, and site characteristics will all be documented through instruction stipulated in the aforementioned Guidelines.
- The utilization of searcher efficiency and carcass removal trials to determine the percentage of carcasses found by investigating parties and accurately estimate mortality rates and also the length of time that a carcass remained in the field for possible detection will be undergone.

- Adjusted fatality estimates for birds and bats based on the results of searcher efficiency trials and carcass removal trials in order to approach a more specific estimate of bird and bat mortality within the Project Site and aid in the mitigation of detectable adverse effects
- Breeding and migrating bird habituation and avoidance studies to assess the species composition and relative of abundance of birds along a gradient from turbines, and between Project areas and reference areas.
- Acoustic bat surveys to determine the relationship between bat activity data and bat fatalities

The post-construction monitoring program will be developed in consultation with the NYSDEC and USFWS. Exact details of the post-construction monitoring program will be determined through discussions and consultation between NYSDEC, USFWS, and the Applicant based off of site specific analysis. Post-construction monitoring protocol will be in place prior to the start of Project operation.

(5) Bird and Bat Impact Avoidance and Minimization Techniques

Please refer to section 22(f) and 22(g) for more information regarding bird and bat impact avoidance and minimization techniques.

22(i) Map Depicting Wetland Boundaries

Wetland survey methodologies were designed to identify all wetlands and waterbodies (rivers or streams) at a minimum distance of the anticipated limit of disturbance from Project components. Disturbance limits included a 250-foot radius around each turbine center point, a 200-foot corridor for proposed access roads, collection line, and a 100-foot buffer around construction areas for associated substations, laydown yards, and the O&M building. This area is referred to as the "Wetland Delineation Survey Area" throughout this Exhibit. TRC investigated approximately 3,014 acres of leased private lands within the Wetland Delineation Survey Area associated with Project infrastructure and non-Article VII interconnections. All current wetland and waterbody delineations took place in the late summer and fall of 2016, and the spring and summer of 2017. Wetland delineations were conducted simultaneously for both the wind farm and also the associated transmission line corridor for the Project. The associated transmission line corridor will be permitted separately through the Article VII process. Please note, all wetland and stream features described herein are inclusive to the generation portion of the Project Area.

Surveys were performed in accordance with criteria set forth in the USACE 1987 Wetlands Delineation Manual (Environmental Laboratory, 1987) and the 2012 Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (Version 2.0) (USACE, 2012). Data was collected from one or more sample plots in each delineated wetland (depending on the size of the delineated area and any change in cover type), and were recorded on USACE Routine Wetland Determination forms. The boundaries of wetlands were demarcated with pink survey ribbon labeled "wetland delineation" and located with a Trimble Geo 6000 XH GPS unit with reported sub-meter accuracy.

In order to approximate wetland boundaries out to 500 feet from Project components (beyond the delineated portion), TRC conducted desktop analysis incorporating the interpretation of aerial imagery

signatures, on-site observations, soils mapping, analysis of topography, and existing databases of wetland mapping maintained by the USFWS National Wetland Inventory (NWI) and NYSDEC.

Within this Exhibit, wetlands identified past the established Wetland Delineation Survey Area are referred to as Approximate Wetlands. See Figure 22-3 for mapped wetlands within the Project Area and Figure 22-2 depicting TRC delineated and approximated wetlands within the Wetland Delineation Survey Area and subsequent 500 foot buffer zone. The Applicant intends on coordinating with the USACE and NYSDEC on the jurisdictional determination of delineated wetlands in the coming months, now that delineations have concluded based on the current Project layout.

22(j) Determination of Wetland Boundaries

See Appendix 22-2, Wetland and Waterbody Delineation Report, for a detailed description of the determination of wetland boundaries for the Project.

22(k) Characterization of Wetlands within the Project Area

A description of wetland and waterbody cover types delineated within the aforementioned Wetland Delineation Survey Area associated with Project infrastructure and non-Article VII interconnections are described in detail below. Each wetland or waterbody was assigned cover types based off of the Cowardin classification system (Federal Geographic Data Committee, 2013). In some instances, a delineated wetland or waterbody contained multiple cover types due to its larger size and/or a more complex community character. Boundaries were demarcated and data plots were taken from each specific cover type within a wetland or waterbody. This method was done in order to establish a more complete depiction of specific waterbodies and wetlands and also aid in a more informative approach to any potential future mitigation efforts.

Emergent wetlands (PEM) – A total of 85 wetlands delineated within the Wetland Delineation Survey Area associated with Project infrastructure and non-Article VII interconnections contained characteristics representative of the emergent wetland classification. Emergent wetlands are dominated solely by an herbaceous layer of hydrophytic (water tolerant) plant species. Emergent wetlands typically contain deep, nutrient rich soils that remain heavily saturated or even inundated throughout the year.

More specifically, some emergent wetlands witnessed in the Wetland Delineation Survey Area contained characteristics representative of wet meadows (Reschke, 1990). Wet meadows are not a Cowardin classification, however wet meadows are usually found in depressional areas with poorly drained soils and a mix of upland and wetland herbaceous vegetation. Redoxification usually occurs in the upper layers of the soil strata due to wet meadows being drier then emergent marshes on average except for periods of seasonal inundation. Within wet meadows, wetland (hydrophytic) vegetation still dominates the herbaceous layer however these meadows more resemble common grasslands that remain saturated for a significant amount of the growing season. Wet meadow wetlands witnessed in the Wetland Delineation Survey Area were primarily the result of retired agricultural fields returning to preexisting wetland conditions.

Emergent wetlands and also wet meadows encountered in the Wetland Delineation Survey Area were typically dominated by cottongrass bulrush (*Scirpus cyperinus*), sedges and rushes (*Juncus* spp.), reed canary grass (*Phalaris arundinacea*), common boneset (*Eupatorium perfoliatum*), spotted joe-pye weed (*Eutrochium maculatum*), rice cut grass (*Leersia oryzoides*), sensitive fern (*Onoclea sensibilis*), late goldenrod (*Solidago gigantea*), broad leaf cattail (*Typha latifolia*), and American manna grass (*Glyceria grandis*). Evidence of wetland hydrology for these wetlands included surface water, saturation, a high water table, water-stained leaves, oxidized rhizospheres on living roots, drainage patterns, micro-topographic relief, dry season water table levels, and geomorphic positioning. Hydric soil indicators adhered to descriptions and guidelines outlined in *Field Indicators of Hydric Soils in the United States: A Guide for Identifying and Delineating Hydric Soils*, *Version 7.0* (NRCS, 2010). Although hydric soils indications were variable, emergent wetlands within the Wetland Delineation Survey Area typically displayed black to dark brown loamy soils (10YR 2/1 – 10YR 3/2). Variations of characteristics in the soil matrices generally demonstrated Depleted Matrix (F3), Redox Dark Surface (F6), and Redox Depressions (F8) hydric soil indicators.

Scrub-shrub wetlands (PSS) – A total of 12 wetlands delineated within the Wetland Delineation Survey Area associated with Project infrastructure and non-Article VII interconnections contained characteristics representative of a scrub-shrub wetland community. Scrub-shrub wetlands are dominated by woody shrub vegetation which stand less than 20 feet tall. Shrub species dominating the wetland could include true shrubs, a mixture of young trees and shrubs, or trees that are small or stunted due to stressors from explicit environmental conditions.

Scrub-shrub wetlands encountered in the Wetland Delineation Survey Area were typically dominated in the shrub layer by willow species (*Salix* spp.), white meadowsweet (*Spiraea alba*), common winterberry (*Ilex verticillata*), speckled alder (*Alnus incana*), red chokeberry (*Aronia arbutifolia*), red maple saplings (*Acer rubrum*), gray dogwood (*Cornus racemosa*), and high bush blueberry (*Vaccinium corymbosum*). Herbaceous vegetation in these areas were dominated by sensitive fern, cotton grass bulrush, rice cut grass, spotted touch-me-not (*Impatiens capensis*), late golden rod, purple-stem American-aster (*Symphyotrchum puniceum*), and various sedges and rushes. Evidence of wetland hydrology for these wetlands included saturated soils, water-stained leaves, oxidized rhizospheres on living roots, drainage patterns, geomorphic positioning, micro-topographic relief, and dry-season water table levels. Scrub-shrub wetlands within the Wetland Delineation Survey Area typically displayed black to dark yellowish brown (10YR 2/1 – 10YR 3/4) loamy soils. Variations of characteristics in the soil matrices generally demonstrated Depleted Matrix (F3), Redox Dark Surface (F6), Black Histic (A3), and Histosol (A1) hydric soil indicators.

Forested wetlands (PFO) – A total of 40 wetlands delineated within the Wetland Delineation Survey Area associated with Project infrastructure and non-Article VII interconnections contained characteristics representative of forested wetland. Forested wetlands are sometimes referred to as swamps and are dominated by tree species 20 feet or taller with an understory of shrub and herbaceous species. Understory vegetation presence readily varies, as the upper canopy of tree species may block sufficient light for vegetative growth in the understory. Coniferous swamps, lowland hardwood swamps, and floodplain forests are common types of forested wetlands. Soils in forested wetlands are typically inundated or saturated in early spring into summer. Some forested wetlands may dry up entirely which

reveal water stain marks along the trunks of exposed tree species and also shallow, buttressed, root systems indicative of periods of heavy inundation events.

Forested wetlands encountered in the Wetland Delineation Survey Area were typically dominated by tree species of eastern hemlock (*Tsuga canadensis*), red maple, silver maple (*Acer saccharinum*), green ash (*Fraxinus pennsylvanica*), swamp white oak (*Quercus bicolor*), American elm (*Ulmus americana*), and quaking aspen (*Populus tremuloides*). Understory vegetation typically included saplings of the aforementioned species or shrub species like common winterberry, speckled alder, or eastern hop-horn beam (*Ostrya virginiana*). Herbaceous species included cinnamon fern (*Osmunda cinnamomea*), sensitive fern, spotted touch-me-not, American mannagrass, rush and sedge species, rice cut grass, cotton grass bulrush, American wild mint (*Mentha arvensis*), purple-leaf willowherb (*Epilobium coloratum*), brome-like sedge (*Carex bromoides*), late golden rod, and purple-stem American-aster. Evidence of wetland hydrology for these wetlands included saturated soils, water-stained leaves, oxidized rhizospheres on living roots, a high water table, water marks, buttressed roots, moss trim lines, drainage patterns, a thin muck surface layer, geomorphic positioning, micro-topographic relief, cracks in the surface soil, and dry-season water table levels. Forested wetlands within the Wetland Delineation Survey Area typically displayed black to dark brown (10YR 2/1 – 10YR 3/3) silty loam soils. Variations of characteristics in the soil matrices generally demonstrated Depleted Below Dark Surface (A11), Depleted Matrix (F3), Redox Dark Surface (F6), Loamy Gleyed Matrix (F2), and Histosol (A1) hydric soil indicators.

Open water wetlands (PUB) – A total of 10 wetlands delineated within the Wetland Delineation Survey Area associated with Project infrastructure and non-Article VII interconnections contained characteristics representative of open water wetlands or more commonly referred to as ponds. Ponds within the Wetland Delineation Survey Area included small man-made farm ponds used for irrigation or recreation, beaver impoundment areas, or naturally occurring ponds. As these are bodies of standing water, evidence of wetland hydrology was decisively present with standing water ranging from approximately 3-10 feet in depth. Most pond features contained a fringe of hydrophytic herbaceous vegetation representative of the aforementioned common emergent wetland species. Soils within and around these pond features typically contained thick dark organic layers of mucky silt loam which ranged in black to very dark gray coloration of the soil matrices (10YR 2/1 – 10YR 3/1). Characteristics in the soil matrices generally demonstrated thick mucky soils representative of Histosol (A1), Histic Epipedon (A2), and Black Histic (A3) indicators.

Waterbodies (RUP, RIN, REPH) – A total of 85 waterbodies were delineated within the Wetland Delineation Survey Area associated with Project infrastructure and non-Article VII interconnections. Classification of waterbodies were dependent on a temporal description of their usual level of flow regimes. Perennial streams (*RUP*) tend to flow all year except during severe drought conditions. Perennial streams can flow below the water table and receive groundwater flow sources from springs or groundwater seepages on slopes. Intermittent streams (*RIN*) flow only during certain times of the year from alternating springs, snow melts, or from runoff from seasonal precipitation events. Intermittent streams can flow above or below the water table. Ephemeral streams (*REPH*) flow sporadically and are entirely dependent on transient precipitation from storm events or from periodic snow melts. These streams tend to flow above the water table and are often found as drainage features adjacent to, or within, the headwaters of a more major stream system. Waterbodies encountered in the Wetland Delineation Survey Area were mostly ephemeral in nature and occurred in forested communities along

moderate to steep gradients (5-12%). Waterbodies within the Wetland Delineation Survey Area generally contained channel substrates of bedrock, cobble, and gravel with probed stream depths in the range of <1-6 inches. Most waterbodies were determined to be only utilized as drainage features and lacked substantial features to permit the prevalence of aquatic ecologies. Only a small number of waterbodies within the Wetland Delineation Survey Area were determined to contain significant aquatic habitat to establish and support fish and wildlife populations. Most of the stream systems supporting aquatic habitats were found to be perennial in nature as an annual flow regime allows for more readily established life cycles.

22(l) Qualitative and Descriptive Wetland Function Assessment

Please refer to Section 22(m) below for a summary of the qualitative and descriptive wetland function assessment performed for the Project. For more detail the referenced Wetland Functions and Assessment Report can be reviewed in Appendix 22-12.

22(m) Wetland Functions and Values Assessment

Recognizing the limitations of wetland assessment in only the aspect of numerical weightings and averaging, stresses the need for a qualitative description of the physical, chemical, biological, and geological characteristics of wetlands in order to identify and measure exhibited functions and values. For many audiences, such a measurement can be seen as highly subjective. In the past, efforts to utilize best professional judgments to interpret functions and values would often be unorganized, unpredictable, and legally difficult to defend and document (USACE, 1995). In response, the USACE developed a supplement to the *Highway Methodology Workbook* entitled *Functions and Values: A Descriptive Approach* (Supplement). This assessment example was created in order to collect and describe the functions and values assessment of wetlands in a measurable and un-biased perspective. It is for these reasons that the Applicant elects to specifically follow the USACE, Highway Methodology, and processes outlined in the Supplement, to conduct a qualitative assessment of the physical characteristics of the wetlands and identify the functions and values which they exhibit.

The functions and values of wetlands are the favorable roles that a wetland provides to its surrounding environment and also towards the benefit of human society. Functions and values are a result of specific biological, chemical, and physical characteristics within the wetland and any complex relationships maintained by the wetland within its watershed, local environment, and also with the general public.

Assessing a specific wetland's function and value are principally needed to determine the overall effects an impact or alteration may have on a wetland feature. Ultimately, such a measurement aids in establishing the appropriate level of mitigation after impacts to a wetland occur. More recently, the assessment of the functions and values for wetlands have been used to categorize wetland features based on their level of significance, which might ensure that wetlands with higher functions or values receive proper vindication rather than solely compensating for a measured physical impact. As such, a wetland functions and values assessment was undergone to provide a comprehensive description of the functions and values of all wetlands delineated for the Project.

The thirteen functions and values that are considered by the Supplement and by the USACE are listed below. The list includes eight functions and five values. It should be noted that these functions and values are not the only wetland functions and values possible. However, these functions and values do represent the current working suite of descriptors provided by the USACE which will be used to provide an objective representation of the wetland resources associated with the Project.

Wetland Functions

Wetland functions are the properties or process of a wetland ecosystem which aid in promoting a homeostatic natural environment while in the absence of human interference. A wetland's specific function results from both organic and inorganic components, including physical, geologic, hydrologic, chemical and biological systems. These components include all processes necessary for the self-maintenance of the wetland ecosystem such as, but not limited to, ground water recharge, primary production, nutrient cycling, and sediment retention. Wetland functions relate to the ecological significance of wetland properties without regard to subjective human values. The eight functions defined by the Supplement including short descriptions defining each function are as follows:

1. Flood-flow Alteration - This function applies to the effectiveness of the wetland in reducing flood damage by containing an enhanced ability to store floodwaters for an extended period of time following heavy precipitation events.

2. Groundwater Recharge/Discharge - This function defines the potential for a wetland to act as a source of groundwater recharge and/or discharge. Recharge describes the potential for the wetland to contribute water to an underlying aquifer. Discharge relates to the potential for the wetland to act as a source of groundwater transfer to the surface i.e., springs and hillside seeps.

3. Sediment/Pollutant Retention - This function describes the ability of a wetland to hinder the degradation of water qualities downstream. It relates to the effectiveness of the wetland as a trap for sediments, toxicants, or pathogens based off of its geomorphic positon, connectivity, soil thickness, and other physical characteristics.

4. Fish and Shellfish Habitat - This function defines a wetland's ability to contain or influence suitable habitats for fish and shellfish species.

5. Sediment/Shoreline Stabilization - This function defines a wetland's ability to effectively stabilize streambanks and shorelines against future erosion events.

6. Production (Nutrient) Export - This function relates to a wetland's ability to produce food or usable products for organisms, including humans, within the trophic levels associated with the watershed.

7. Nutrient Removal/Retention/Transformation - This function relates to the wetland containing the ability to prevent excess nutrients entering aquifers or surface waters such as ponds, lakes, streams, rivers, or estuaries.

8. Wildlife Habitat - This function considers the effectiveness of the wetland to provide habitat for various types and populations of animals typically associated with wetlands and their periphery.

Resident and migrating species were considered along with the potential for any state or federally listed species occurring within then target wetland.

Wetland Values

Values are the societal benefits that occur as a result from one or more of the aforementioned functions and can also include other physical characteristics associated with a wetland which benefits society. Most wetlands have corresponding public value to an assessable degree. The value of a particular wetland function, or a combination of functions, is based on the interpretative judgment of the significance attributed to the wetlands through the various functions it provides. The judgment of value was based on the opinion of recognized staff members whose views will be ultimately weighed and considered by the presiding agencies for the Project. The five values defined by the Supplement and adopted for use in this assessment, including short descriptions defining each value, are documented below.

1. Recreation - This value indicates if the wetland is effective in providing, or assisting in the establishment of, recreational opportunities such as boating, fishing, hunting, and other leisurely pursuits. Recreation in this capacity includes both consumptive and non-consumptive activities. Consumptive activities consume or diminish the plants, animals, or other resources that are naturally located in the wetland, whereas non-consumptive activities do not.

2. Education/Scientific Value - This value considers the effectiveness of the wetland as a site for public education or as a location for scientific research.

3. Uniqueness/Heritage - This value applies to wetlands and associated waterbodies which contain a singular or rare quality. Special qualities may include such things as the wetland's history and the presence of archaeological sites, an unusual aesthetic quality, historical events which may have taken place at the wetland, or unique plants, animals, or geologic features located within, or supported by, the wetland feature.

4. Visual Quality/Aesthetics - This value relates to the visual and aesthetic qualities of the wetland.

5. Threatened or Endangered Species Habitat - This value relates to the effectiveness of the wetland or associated waterbodies to specifically support threatened or endangered species.

Based on processes outlined in the Supplement, a spreadsheet was created to include several basic considerations that help identify the primary functions and values provided by wetlands. These considerations included observed vegetation conditions, hydrologic conditions, size, adjacent area conditions, and the availability of public access. To see the aforementioned spreadsheet and receive more detail on the functions and values assessment, see Appendix 22-12. 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. All wetlands identified within the Wetland Delineation Survey Area were entered into the spreadsheet. Various wetland characteristics were identified for each wetland. Based on these data, the primary functions and values provided by each wetland were determined.

Wetlands delineated within the Wetland Delineation Survey Area associated with Project infrastructure and non-Article VII interconnections displayed multiple functions based on their specific site characteristics. All associate delineated wetlands were determined to have the ability to provide some function of groundwater recharge/discharge and wildlife habitat. Other functions displayed within wetlands delineated within the Wetland Delineation Survey Area associated with Project infrastructure and non-Article VII interconnections include:

- Flood-flow Alteration (54 wetlands)
- Sediment/Toxicant/Pollutant Retention (68 wetlands)
- Fish and Shellfish Habitat (22 wetlands)
- Sediment/Shoreline Stabilization (22 wetlands)
- Production Export (30 wetlands)
- Nutrient Removal/Retention/Transformation (70 wetlands)

Values were found to occur in a limited number of wetlands within the Wetland Delineation Survey Area associated with Project infrastructure and non-Article VII interconnections. As stated previously, values of a select number of wetlands within the Wetland Delineation Survey Area included Recreation, Educational/Scientific Value, Uniqueness/Heritage, Threatened/Endangered Species Habitat, and Visual Quality/Aesthetics.

In general, much of the Project area is not accessible to the public. One wetland, FA-W-4, is associated with NYSDEC freshwater wetland RX-2, and can be seen along a scenic portion of New York State Route 248 in the Hamlet of Barney Mills located in the Town of West Union. This wetland is believed to provide the values of Recreation, Educational/Scientific Value, Uniqueness/Heritage, Threatened/Endangered Species Habitat, and Visual Quality/Aesthetics due to its public accessibility, large size, multiple cover types, and an extensive open water area. Other values displayed within wetlands delineated within the Wetland Delineation Survey Area include:

- Uniqueness/Heritage (9 wetlands)
- Threatened/Endangered Species Habitat (52 wetlands)

Assessing a specific wetland's function and value are principally needed to determine the overall effects an impact or alteration may have on a wetland feature. Ultimately, such a measurement aids in establishing the appropriate level of mitigation after impacts to a wetland occur. As such, this functions and values assessment will be utilized during the impact analysis and mitigation planning efforts for this Project. Functions and values were only evaluated for wetlands that were observed during the growing season, and where vegetation, soils and hydrological data were collected as part of a formal delineation. Functions and values assessments will be conducted on wetlands defined through formal delineations of new areas during the spring growing season of 2017 and appended in a supplemental report.

To receive more detail on the functions and values assessment please see Appendix 22-12 of this Application.

22(n) Off-Site Wetlands Hydrological and Ecological Influence Analysis

As described previously, wetlands outside of the Wetland Delineation Survey Area associated with Project infrastructure and non-Article VII interconnections were approximated within at least 500 feet of Project components using interpretation of aerial imagery, review of wetland mapping databases maintained by the NWI and NYSDEC, reference to on-site observations, and an analysis of publically available topographic contour mapping. The approximation of wetlands within at least 500 feet of Project components was utilized in order to determine hydrological connections to offsite wetlands, including state mapped wetlands protected by NYSDEC which may be in close proximity to Project components. Within the total amount of approximated wetlands, a total of 116 portions of approximated wetlands were identified to reside within 500 feet of the Project components. A total of 86 wetlands identified within 500 feet of Project components are presumed to be hydrologically connected to wetlands identified within the Wetland Delineation Survey Area associated with Project infrastructure and non-Article VII interconnections. As such, these specific approximated wetlands would likely be considered federally jurisdictional by the USACE. Jurisdiction over federally regulated wetlands will ultimately be determined by the USACE.

The approximation of wetlands within 500 feet of Project components also revealed that one NYSDEC freshwater wetland has the potential to be hydrologically connected to approximated wetlands identified in the 500 foot approximated wetland corridor. The specific state wetland identified is RX-5. NYSDEC freshwater wetland RX-5 is a Class III, large open water wetland with scrub-shrub and forested wetland surrounding the open water along the periphery. It has been mapped by the NYSDEC at 34.1 acres.

Through desktop analysis it appears that only approximated wetlands within 500 feet of Project components have potential hydrological connections to the additional state wetland RX-5. Although delineated wetlands DL-W-13 and DL-W-18 are in close proximity to approximate wetlands associated with NYSDEC freshwater wetland RX-5, it was determined in the field that these wetlands are separated by upland and are topographically distinct. Delineated wetlands which appear to be hydrologically connected to state-protected wetlands have been mentioned above in Section 22(m) and also stated in the attached Wetland Delineation Report. All delineated wetlands appear to be hydrologically distinct from additional state wetlands except for delineated wetlands FA-W-4 and CL-W-30 which are hydrologically associated to NYSDEC freshwater wetlands RX-2 and RX-4, respectively.

All information, including shapefiles of delineated wetlands suitable for use in GIS software via ESRI's ArcGIS suite of software (e.g., ArcMap), of current delineated portions of the Project have been provided to the NYSDEC as of August 18, 2017.

22(o) Temporary and Permanent Wetland Impacts

During the construction phase of the Project, potential direct or indirect impacts to wetlands and waterbodies may occur as a result of the installation of Project components and in the utilization of temporary workspaces. Mitigation measures, as detailed further below, will be implemented.

In specific reference to individual Project component impacts, the clearing of wind turbine operational areas, the placement of wind turbines, and their foundations, will result in no permanent impact to delineated wetlands and only a temporary impact of 0.29 acre. Furthermore, turbine specific construction operations will result in a permanent impact of 100 linear feet and a temporary impact of 1962 linear feet to waterbodies. The construction of wind turbine and facility access roads is anticipated to result in a 0.05 acre of permanent impact and 0.10 acre of temporary impact. Also, the construction of access roads will result in 69 linear feet of permanent impact to waterbodies and 176 linear feet of temporary impact. The installation of overhead or buried electrical collection lines will result in no permanent impact to delineated wetlands and only temporarily disturb 3.89 acres of wetlands. In addition, collection line specific construction operations will result in no permanent impact to waterbodies and only a temporary impact of 1,487 linear feet to waterbodies.

During the construction phase for the Project, vegetative clearing and soil disturbance will be required during the siting and burial of the electrical collection lines or from pole installation along potions of the overhead collection line. However these areas will be left to regrow (vegetation will be maintained along the overhead potions of the collection line to avoid adverse impact to electrical lines) once construction has completed. Impacts as a result of construction of Project non-Article VII interconnection facilities (collection substation, O&M building, laydown yards) will result in no impacts to wetlands or waterbodies. Likewise, the development and use of temporary workspaces will result in only 0.001 acre of temporary impacts to wetlands and 0.00 linear feet to waterbodies.

Indirect impacts to wetland or waterbodies may result from erosion and sedimentation events caused by construction activities in close proximity to wetlands or waterbodies. This indirect impact may occur within wetlands and waterbodies adjacent to work areas even if there are no direct wetland or waterbody impacts anticipated for the specific area. Erosion and sediment control plans will be put into place and follow best management practices in order to mitigate any foreseen water quality issues into adjacent wetlands or waterbodies.

In summary, a total of approximately 4.1 acres of wetlands and 3,870 linear feet of waterbodies will be impacted as a result of the Project. Of this disturbance, 4.1 acres of wetland and 3,701 linear feet of waterbodies will be disturbed only temporarily. A total of 0.05 acres of wetland and 169 linear feet of waterbodies are anticipated to be permanently lost as a result of Project component placement or direct placement of fill in wetlands and waterbodies. The Applicant proposes to install buried interconnect via horizontal directional drilling, where practicable, to further reduce impacts to wetlands and waterbodies in applicable areas. Temporary and permanent impacts to identified wetlands and waterbodies are presented below in Table 22-11.

Table 22-11. Wetland and Waterbody Impacts

	Wetland Impacts (Acres)			Waterbody Impacts (Linear feet)		
	Permanent Impacts	Temporary Impacts	Total Impacts	Permanent Impacts	Temporary Impacts	Total Impacts
Turbine Sites	0	0.29	0.29	100	1962	2062
Access Roads	0.047	0.094	0.141	69	176	245
Collection Buried	0	3.89	3.89	0	1487	1487
Access Road and Collection Collocated	0	0.025	0.025	0	76	76
Temporary Workspace	0	0.001	0.001	0	0	0
Total	**0.047**	**4.09**	**4.137**	**169**	**3701**	**3870**

The construction and operation phases of the Project will not result in impact NYSDEC freshwater wetlands within the Project Area or their established 100-foot protective upland buffers. Attention was made within the siting effort to rigorously avoid impact to NYSDEC freshwater wetlands and their 100-foot upland buffers in order to avoid impacts to these protected features.

22(p) Avoidance and Mitigation for Wetland Impacts

The Project layout design process utilized the identification of wetland and waterbody locations in order to place components where they would avoid and/or minimize impacts to wetlands and waterbodies wherever possible. The current Project layout avoids impacts to wetlands and waterbodies by locating turbine structures outside of delineated features and also routing access roads and collection lines around delineated features where practicable. Where linear wetlands and streams are encountered and must be bisected by Project components (access roads and collection lines) the most narrow and/or previously disturbed portions of the wetlands will be utilized for as the site of impact. Where beneficial and cost effective, the Applicant is anticipating the utilization of directional drilling within forested wetlands or along stream channels during the placement of buried collection line. Directional drilling aids in the elimination of surface wetland and waterbody impacts in areas where it is used. Construction and operation of the Project will be conducted in accordance with Article 15 of NYS Environmental Conservation Law (ECL).

Although attempts were made to avoid and minimize wetland and waterbody impacts where practicable, there will still be unavoidable impacts to these features as a result of the Project. A majority of wetland and stream impacts will occur in wetlands regulated by the USACE only. However, impacts to select stream will also incorporate NYSDEC jurisdiction and mitigation requirements. The Applicant will

propose compensatory mitigation to the USACE which will be determined in consultation with NYSDEC and USACE. The mitigation effort to be conducted by the Applicant will establish a "no net loss" of wetlands. Forms of mitigation available to the Applicant include the purchase of credits from an approved in-lieu-fee program, the creation of an on-site compensatory mitigation area, the restoration or enhancement of wetlands in the impacted watershed, or some combination of these options. Correspondence with USACE and NYSDEC agencies will be utilized to assist in the decision making process as to which mitigation strategy is best suited for the Project based off of local and regional constraints.

Siltation and sedimentation impacts will be negligible throughout the construction phase of the Project. This assumption relies on the fact that the Applicant will follow a stringent and specific mitigation strategy for indirect impacts to wetlands. Keystone actions that the Applicant will conduct to limit indirect impacts include the creation of:

Prohibited Access Areas – Waterbodies will be labeled prohibiting the use of motorized equipment in these areas except where a stream is crossed by permitted access roads or through non-jurisdictional use of temporary matting.

Restricted Activities Areas – A 100-foot protective upland buffer will be assigned to all wetlands and waterbodies. This upland buffer area will be referred to on construction related mapping and guidelines as a "Restricted Activities Area". Certain specific limitations will be put in place for these areas and will include:

- No placement of cleared vegetation and slash materials within or adjacent to a wetland or waterbody
- No accumulation of construction debris or trash within the restricted area
- No use of herbicide within the restriction area (or as required per manufacturer's instructions)
- No parking of construction equipment, vehicles or mobile operations centers in the restricted area
- No degradation of stream banks
- No equipment washing or refueling within the restricted area
- No storage of any petroleum or chemical material and no disposal of excess concrete or concrete wash water within the restricted area.

A soil erosion and sedimentation control plan will be developed and implemented as part of the SPDES General Permit for the Project. Specific control measures are identified in the Preliminary SWPPP, which can be reviewed in Exhibit 23. The location of all control features will be indicated on construction drawings and reviewed by the contractor and other appropriate parties prior to construction. Through coordination with an on-site Environmental Monitor, these control 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.

The policy of New York State, set forth in Title 5 of Article 15 of the ECL, is to preserve and protect lakes, rivers, streams, and ponds. In an effort to classify which steam is a jurisdictionally protected feature of

the state, all waters of the state are provided a class and standard designation based on existing or expected best usage of each water or waterway segment. The classification AA or A is assigned to waters used as a source of drinking water. Classification B indicates a best usage for swimming and other contact recreation, but not for drinking water. Classification C is for waters supporting fisheries and suitable for non - contact activities. The lowest classification and standard is D. Waters with classifications A, B, and C may also have a standard of (T), indicating that it may support a trout population, or (TS), indicating that it may support trout spawning (TS). Special requirements apply to sustain these waters that support these valuable and sensitive fisheries resources. The special requirements of streams dedicated to hold trout species require actions within the waterway to be limited during the spawning and migratory season of trout species.

Construction operations for the Project will comply with work period restrictions that are established to protect fish spawning and migration. Specifically, the work period restriction is from October 1 to April 30 for streams with trout and from March 15 to June 15 for other protected streams (NYSDEC, 2017). However, the potential for site-specific consultation with NYSDEC may result in less restrictive no-work periods. As such, seasonal work period restrictions on in-stream work during the construction phase of the Project will be established through direct interaction and consultation with the NYSDEC. See Exhibit 23 for more details on mitigation of impacted aquatic resources.

(1) Environmental Compliance and Monitoring Program

In an effort to maintain environmental compliance and the integrity of the Project, the Applicant will provide funding for an independent, third-party environmental monitor to oversee compliance with environmental commitments and permit requirements. In addition, the Applicant has an established environmental compliance construction team that will also actively monitor the all construction activities. All permit conditions will be tracked to ensure compliance and oversight of the construction effort. Finally, NextEra has a corporate environmental auditing team that will conduct periodic environmental audits during operations. The environmental audits are conducted generally once every three years at the site by a trained team of environmental auditors assessing permit condition compliance and general operating standards and procedures. Audit findings are provided in confidential reports to management and corrective actions and good management practices are all reported as well.

The environmental compliance and monitoring program will be implemented in five phases which are summarized below.

Preparation Phase

Established environmental monitors will review all environmental permits and prepare an environmental management document (Environmental Compliance Manual) that will be utilized in support of permit guidelines for the duration of the construction and operation of the Project. This document will depict all environmental requirements for construction and restoration included in all Project related permits and approvals, and will be utilized as a resource for the management of environmental issues which may occur.

Training Phase

Environmental monitors will conduct mandatory environmental training sessions for all contractors and subcontractors before they begin working on the site. The purpose of the training sessions will be to distribute the Environmental Compliance Manual, explain the environmental compliance program in detail, prior to the start of construction, and to assure that all personnel on site are aware of the permitting requirements for construction of the Project. Likewise, the corporate environmental compliance team will provide construction staff training concerning permit conditions and compliance requirements.

Coordination Phase

Prior to construction, environmental monitors along with associated contractors will conduct an on-site walk down of areas to be impacted by construction operations. Work area limits will be defined by flagging, staking, or fencing prior to construction. This walk down will aid in the identification of any landowner preferences and concerns. This walk down will also locate sensitive resources, clearing limits, and proposed wetland and waterbody crossings and impacts. The placement of sediment and erosion control features will also be located. The pre-construction site review will serve as a critical means of identifying any required changes in the construction of the Project in a timely manner in order to avoid future delays to project construction timeframes. Changes may require an agency notification period and take time for approval to be received.

Construction Phase

The EM will conduct daily inspection of active work areas. The environmental monitor will conduct inspections of all areas requiring environmental compliance during construction activities, with an emphasis on those activities that are occurring within or close proximity to jurisdictional/sensitive areas. The EM will conduct daily operation meetings with contractors to coordinate scheduling, establish daily monitoring priorities, and address compliance issues.

Restoration Phase

When the construction phase of the Project is nearing completion in select areas, the monitor will work with the contractors to locate areas which require restoration. The EM will define and coordinate the proper restoration of specific area and incorporate the monitoring of these restoration area in their daily task list. As areas approach full restoration, the EM will document the results and determine if further restoration effort is needed or if the site can be removed off of the daily investigation list.

Agricultural Areas

The Applicant will conduct a monitoring and remediation period of no less than two years in agricultural areas after completion of the construction phase of the Project. This two year period will be utilized to collect and document the temporal response of agricultural lands post-construction with influence of nominal climatic conditions throughout the year. This phase will be used to identify any remaining agricultural impacts associated with construction that are in need of further restoration effort. General conditions to be monitored include topsoil thickness, topsoil compaction level, topsoil texture and rock

content, crop production, drainage ability, and the return to pre-existing operational conditions (fence work, tiling etc.), amongst other characteristics. The environmental monitor will identify any issues through on-site monitoring of all agricultural areas impacted by construction and will keep open correspondence between contacts with respective farmland operators and the New York State Department of Agriculture and Markets (NYSDAM) in order to properly mitigate issues. The Project will be constructed in accordance with NYSDAM Guidelines for Agricultural Mitigation for Wind Power Projects (included as Appendix 22-13 of this Application).

22(q) Temporary and Permanent Impacts of Agricultural Resources

Agricultural lands in the Project Area are extensive and consist of field crops (hayfields), row crops (corn and soy), and pastureland (grazing lands for dairy cattle). Agricultural land was documented within the Project Area and mapped in the aforementioned vegetation community mapping effort in Section 22(a) Plant Communities.

Project components have been located to avoid significant permanent impact to active agricultural lands to the maximum extent practicable. Access roads to turbine locations and Facility Sites have been sited along edges of active agricultural fields and scrublands and forest in order to mitigate impacts to each community type. Although attempts to limit impacts agricultural areas have been undertaken, there are still impacts to agricultural lands in small instances throughout the Project. Per 16 NYCRR 1001.22(q), construction of the Project Area will result in disturbance of approximately 318.8 acres of agricultural vegetation. Specifically, a total of 19.3 acres will be permanently impacted and a total of 299.6 acres will be temporarily impacted by Project construction actions. As mentioned above, to help minimize Project impacts to active agricultural land, coordination will continue with the NYSDAM and construction of components within agricultural areas will adhere to the *Guidelines for Agricultural Mitigation for Wind Power Projects*. After the construction phase of this Project has been completed, 299.6 acres of these impacted areas will be restored. Mitigation measures to protect and restore agricultural soils within the Project Area will be undertaken during and after the construction phase of the Project.

Mitigation efforts will include the restoration of all temporarily disturbed agricultural land according to the NYSDAM *Guidelines for Agricultural Mitigation for Wind Power Projects* (Appendix 22-13). To the extent practicable, existing farm roads will be utilized for access to Project components placed within agricultural areas. In areas where new temporary roadways are to be established, topsoil will be stripped and stockpiled and kept separate from the subsoil. Top soil will be stockpiled in close proximity to the area subjected to disturbance and will be reintroduced post-construction and after sufficient aeration and overturning of the impacted subsoil takes place.

During the construction phase of the Project, actions conducted while in agricultural lands will adhere to the following conditions:

- Existing farm roads will be chiefly used for temporary and permanent access to Project components to the extent practicable in the layout of the Project.
- During the construction of temporary access roads to deliver turbines, bury collection line, or work within temporary work areas, topsoil in the impacted area will be stripped and stockpiled alongside the area of disturbance but within the property from which it was removed.

- Topsoil will be kept separate from subsoil. Topsoil will not be stripped during saturated conditions when such actions would damage agricultural soils or create sedimentation events.
- All vehicular movements and construction activity will be restricted to areas where topsoil has been removed.
- All temporarily disturbed agricultural soils will be restored following construction.
- Restoring the impacted agricultural areas will follow the outlined processes below:
    - Complete removal of temporary fill.
    - Decompaction of compacted subsoils using appropriate machinery until soils are returned to preexisting conditions.
    - Removal of stones (four inches and larger in size) from decompacted subsoil.
    - Spreading of stockpiled topsoil over the decompacted subsoil, and reestablishing pre-construction contours to the extent practicable.
- Removal of stones (four inches and larger in size) following the spreading of topsoil.
    - Stabilization through the seeding and mulching of topsoil. Specific seed selection for stabilization of topsoil in impacted agricultural fields will be based on guidance provided by the landowner and NYSDAM personnel.

During the construction phase, the Environmental Monitor will assure that operations strictly adhere with the construction plans/documentation and soil protection measures described above. The Applicant and/or Environmental Monitor will consult with NYSDAM during construction and notify NYSDAM when deviation from the Guidelines may be potentially necessary as a result of land owner preference or intangible environmental constraints.

22(r) Shapefiles

Shapefiles containing all components as described in Section 22(a-q) and in NYSDEC 2016 Guidelines for Conducting Bird and Bat Studies at Commercial Wind Energy Projects, were submitted to the NYSDEC more than 30 days before the Applicant submitted this Article 10 Application. The same shapefiles were also sent to the NYSDPS and USFWS.

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