# Galloo Island Wind Energy Facility

## Case No. 15-F-0327

# 1001.22 Exhibit 22

# Terrestrial Ecology and Wetlands

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# EXHIBIT 22 TERRESTRIAL ECOLOGY AND WETLANDS

(a) Plant Communities

Plant communities were mapped for all land area within the Facility Site using Geographic Information System (GIS) software. Plant communities were classified and mapped according to *Ecological Communities of New York State Second Edition* (Edinger *et al.*, 2014). Designation of ecological community types was based on aerial photo interpretation, field verification from on-site surveys during 2016 and 2017, and a 2007-2008 vegetation inventory (TES, 2009). A map, based on aerial photography, showing locations and extent of identified plant communities is included as Figure 22-1. All of the major ecological communities found within the Facility Site are common in New York State. The ecological community types in the Facility Site can be classified within four broad categories: Grassland, Forestland, Shrublands, and Aquatic Communities. Within these four categories, the dominant community type in the Facility Site is successional old field (40%), followed by successional northern hardwoods (27%), and cropland/field crops (8%). Hemlock-northern hardwood forest, successional shrubland, hemlock-hardwood swamp, red maple-hardwood swamp, shrub swamp, shallow emergent marsh, sedge meadow, inland calcareous lake shore, eutrophic pond, and mowed lawn occur to a lesser extent. Descriptions of dominant vegetation within the Facility Site are provided below for each of these ecological communities and an inventory of plant species observed on the Facility Site is include in Appendix X. Additional, detailed descriptions of wetland community types encountered during on-site wetland delineations is provided in section (j) below.

(1) Grasslands

Grassland (i.e., fields of various successional stages), constitutes the largest ecological community type within the Facility Site, occupying approximately 1,011 acres (52% of the approximately 1,930-acre Facility Site). Specific grassland communities encountered resemble four different grassland types described in *Ecological Communities of New York State* (2014). These grassland types occur throughout the Facility Site in areas of little or no canopy cover, and are interspersed between forested areas. Specific grassland types within the Facility Site are described below.

*Successional Old Field*

As defined by Edinger *et al*. (2014), a successional old field is a meadow dominated by forbs and grasses that occurs on sites that have been cleared and plowed (for farming or development), and then abandoned. Successional old field occupies approximately 766 acres (40%) of the Facility Site. This community is located throughout the Facility Site, especially in the southern and eastern portions of Galloo Island. The successional old fields located on Galloo Island are quite expansive and range in their characteristics from near monocultures of

the invasive pale swallow-wort (*Cynanchum rossicum*) to areas typical of open fields maintained by periodic mowing. Many of the successional open fields in the Facility Site contain a sparse covering of trees and shrubs and are heavily dominated by pale swallow-wort. Herbaceous species common in these areas include spotted knapweed (*Centaurea stoebe* ssp*. micranthos*), bugloss (*Anchusa arvensis*), common mullein (*Verbascum thapsus*), Kentucky bluegrass (*Poa pratensis*), Canada goldenrod (*Solidago canadensis*), ragweed (*Ambrosia artemisiifolia*), tall fescue (*Lolium arundinaceum*), white bedstraw (*Galium mollugo*), and common bird's-foot trefoil (*Lotus corniculatus*). Shrubs such as common juniper (*Juniperus communis*), Morrow's honeysuckle (*Lonicera morrowii*), nannyberry (*Viburnum lentago*), rugosa rose (*Rosa rugosa*), and silky dogwood (*Cornus amomum*) are also components of this community. Sparingly present trees include American elm (*Ulmus Americana*), apple (*Malus* sp.), black gum (*Nyssa sylvatica*), and shagbark hickory (*Carya ovata*) (TES, 2009). Collectively, shrubs and trees represent less than 50% cover in these areas.

Successional old field communities in the Facility Site provide habitat for species that prefer open grasslands. Wildlife listed as species of greatest conservation need (SGCN), species of special concern (SSC), and state and federal-listed threatened (ST, FT, respectively) and endangered (SE, FE, respectively) or state-listed protected (SP) that could potentially utilize this ecological community include American kestrel (*Falco sparverius*) (SGCN), bobolink (Dolichonyx oryzivorus) (SGCN), eastern meadowlark (*Sturnella magna*) (SGCN), grasshopper sparrow (Ammodramus savannarum) (SSC), short-eared owl (*Asio flammeus*) (SE), and northern harrier (*Circus cyaneus*) (ST) (see Table 22-5).

*Cropland/Field Crops*

Remnant agricultural fields are present on the northern end of Galloo Island and comprise approximately 9% of the Facility Site. These areas, which are planted with hay, do not contain a tree or shrub layer but do have herbaceous species present in addition to the crop. These species include pale swallow-wort, alfalfa (*Medicago sativa*), buckwheat (*Fagopyrum esculentum*), common wheat (*Triticum aestivum*), cow vetch (*Vicia cracca*), false pennyroyal (*Trichostema brachiatum*), green foxtail (*Setaria viridis*), lady's thumb (*Polygonum persicaria*), pilewort (*Erechtites hieracifolia*), and yellow cress (*Barbarea vulgaris*).

Cropland/field crop communities in the Facility Site provide habitat for species that prefer open fields, pastures, and meadows. Wildlife listed as SGCN, SSC, or T&E that could potentially utilize this ecological community include American kestrel, eastern meadowlark, American woodcock (*Scolopax minor*) (SGCN), northern harrier (ST), grasshopper sparrow, and bobolink (see Table 22-5).

*Mowed Lawn*

Areas of mowed lawn are located on the eastern side of the Facility Site and are regularly maintained. These areas of Galloo Island include most of the area surrounding the existing buildings located on the eastern side of Galloo Island in addition to the grass airplane runway. There are no trees or shrubs present and the herbaceous ground cover includes pale swallow-wort, timothy (*Phleum pretense*), bird's foot trefoil, Canada thistle, orchard grass (*Dactylis glomerata*), slender vetch (*Vicia tetrasperma*), and smooth brome (*Bromus inermis*). Mowed Lawn communities in the Facility Site provide habitat for species that prefer open grasslands for foraging. Wildlife listed as SGCN, SSC or T&E that could potentially utilize this ecological community include American kestrel and northern harrier (see Table 22-5).

*Sedge Meadow*

Sedge Meadow is a common wetland community type found throughout the Facility Site. It is usually located adjacent to open field and agricultural areas and has soils that are permanently saturated or seasonally flooded (Edinger *et al*., 2014). These communities are dominated by a variety of sedges, grasses, and rushes. Sedge meadow dominant species found on the Facility Site include northern tickle grass (*Agrostis scabra*), creeping bentgrass (*Agrostis stolonifera*), fox sedge (*Carex vulpinoides*), lake-bank sedge (*Carex lacustris*), common rush (*Juncus effusus*), and marsh bed-straw (*Galium palustre*).

Sedge meadow communities in the Facility Site provide habitat for species that prefer open or tall grass marsh environments. Wildlife listed as SGCN, SSC, or T&E that could potentially utilize this ecological community including American bittern (*Botaurus lentiginosus*) (SCC), American woodcock, bobolink, cattle egret (Bubulcus ibis) (SP), eastern meadowlark, grasshopper sparrow, least bittern (*Ixobrychus exilis*) (SGCN), northern harrier, sedge wren (Cistothorus platensis) (ST), and short-eared owl (see Table 22-5).

(2) Forestlands

Specific forest communities on Galloo Island resemble four different forest types described in the *Ecological Communities of New York State* (2014). These forests occur throughout the Facility Site, primarily in the central portion and northern edge of Galloo Island. Within the Facility Site, forestlands occupy approximately 830 acres (43%) of the Facility Site.

*Successional Northern Hardwoods*

Successional northern hardwoods are a common ecological community type on the Facility Site and occupy approximately 524 acres (27% of the Facility Site). Dominant canopy species in these forests include big-toothed aspen (*Populus grandidentata*), bitternut hickory (*Carya cordiformis*), gray birch (*Betula populifolia*), and white oak

(*Quercus alba*). Because of the significant pressure from white-tailed deer (*Odocoileus virginianus*) browsing on Galloo Island, the shrub layer in successional northern hardwoods is quite limited. The few shrub species that persist include common juniper, musclewood (*Carpinus caroliniana* ssp. *virginiana*), and downy shadbush (*Amelanchier arborea*). Many areas of this community type have an herbaceous layer completely dominated by pale swallow-wort. In the few areas where pale swallow-wort has not completely dominated the understory, other herbaceous species such as false-nettle (*Boehmeria cylindrica*), garlic mustard (*Alliaria petiolata*), gypsy-weed (*Veronica officinalis*), marginal woodfern (*Dryopteris marginalis*), may-apple (*Podophyllum peltatum*), southern hairgrass (*Agrostis hyemalis*), blackberry (*Rubus allegheniensis*), bottle-brush grass (*Elymus hystrix*), broad-leaf sedge (*Carex platyphylla*), wild geranium (*Geranium maculatum*), Canada anemone (*Anemone canadensis*), and yellow sedge (*Carex flava*) are present.

Successional northern hardwood communities in the Facility Site provide habitat for species that prefer a variety of woodlands. Wildlife listed as SGCN, SSC, or T&E that could potentially utilize this ecological community include Tennessee warbler (*Vermivora peregrina*) (SGCN), black-billed cuckoo (*Coccyzus erythropthalmus*) (SGCN), Canada warbler (*Wilsonia canadensis*) (SGCN), Cooper's hawk (*Accipiter cooperii*) (SSC), sharp-shinned hawk (*Accipiter striatus*) (SSC), brown thrasher (*Toxostoma rufum*) (SGCN), wood thrush (*Hylocichla mustelina*) (SGCN), scarlet tanager (*Piranga olivacea*) (SGCN), black-throated blue warbler (*Setophaga caerulescens*) (SGCN), bald eagle (*Haliaeetus leucocephalus*) (ST), eastern small-footed myotis (*Myotis leibii*) (SSC), little brown myotis (*Myotis lucifugus*) (SGCN), and northern long-eared bat (*Myotis septentrionalis*) (ST, FP) (see Table 22-5).

*Hemlock-Northern Hardwood Forest*

Hemlock-northern hardwood forests in the Facility Site are areas of mixed coniferous and deciduous trees dominated by eastern hemlock (*Tsuga canadensis*), with other canopy species such as balsam fir (*Abies balsamea*), eastern red cedar (*Juniperus virginiana var. virginiana*), northern red oak (*Quercus rubra*), northern white cedar (*Thuja occidentalis*), paper birch (*Betula papyrifera*), white ash (*Fraxinus americana*), and white spruce (*Picea glauca*) occasionally present or co-dominant. Where hemlock is dominant, very little light reaches the forest flora and the understory tends to be very sparse. Shepard's-purse (*Capsella bursa-pastoris*), fox grape (*Vitis labrusca*), common jack-in-the-pulpit (*Arisaema triphyllum ssp. triphyllum*), pale swallow-wort, and common white snakeroot (*Ageratina altissima* var*. altissima*) are some of the understory species found in these habitats.

Hemlock-northern hardwood communities in the Facility Site provide habitat for species that prefer dense, mixed hardwood forests. Wildlife listed as SGCN, SSC, or T&E that could potentially utilize this ecological community include bay-breasted warbler (*Dendroica castanea*) (SGCN), scarlet tanager, olive-sided flycatcher (*Nuttallornis borealis*) (SGCN), black-throated blue warbler, black-billed cuckoo, Cooper's hawk, sharp-shinned hawk, silver-

haired bat (*Lasionycteris noctivagans*) (SGCN), little brown myotis, and eastern small-footed myotis (see Table 22-5).

*Hemlock-Hardwood Swamp*

Hemlock-hardwood swamp is located centrally on Galloo Island as a part of a large central wetland complex. In these communities, eastern hemlock and/or northern white cedar are a dominant in the tree layer along with deciduous trees such as American basswood (*Tilia americana*), black ash (*Fraxinus nigra*), paper birch, quaking aspen (*Populus tremuloides*), and silver maple (*Acer saccharinum*). Other coniferous tress present in these ecological communities are balsam fir and white spruce. In this community, as in successional northern hardwoods, there is significant browsing pressure from white-tailed deer resulting in a very limited shrub layer. Shrub species noted from this community include nannyberry and red-osier dogwood (*Cornus sericea*). Herbaceous plants present include cinnamon fern (*Osmunda cinnamomea*), false-nettle, jewelweed (*Impatiens capensis*), marsh fern (*Thelypteris palustris*), red raspberry, softleaf sedge (*Carex disperma*), spotted Joe-pye-weed (*Eupatorium maculatum*), tall thoroughwort (*Eupatorium altissimum*), and common white snakeroot.

Hemlock-hardwood swamp communities in the Facility Site provide habitat for species that prefer moist, mixed hardwood forests. Wildlife listed as SGCN, SSC, or T&E that could potentially utilize this ecological community include olive-sided flycatcher, bay-breasted warbler, American woodcock, black-throated blue warbler, bald eagle, Cooper's hawk, sharp-shinned hawk, wood thrush, silver-haired bat, Indiana bat (*Myotis sodalist*) (SE, FE), little brown myotis, and eastern small-footed myotis (see Table 22-5).

*Red Maple-Hardwood Swamp*

Red maple-hardwood swamp ecological communities are located throughout the Facility Site with the largest areas of this community type located centrally on Galloo Island. Typically, these communities have red maple (*Acer rubrum*) as the dominant tree species, and can be codominant with other trees such as ashes, elms, or birch. Canopy species found in this community type at the Facility Site include red maple, black ash, green ash (*Fraxinus pennsylvanica*), balsam poplar, wild black cherry (*Prunus serotina var. serotina*), bur oak (*Quercus macrocarpa*), and black oak (*Quercus velutina*). Similar to the other communities on the Facility Site, the shrub layer is limited. Species present include musclewood, buttonbush (*Cephalanthus occidentalis*), and highbush blueberry (*Vaccinium corymbosum*). Herbaceous species include creeping bentgrass, northern tickle grass, common jack-in-the-pulpit, fox sedge, tall-buttercup (*Ranunculus acris*), graceful sedge (*Carex gracillima*), dark-green bulrush (*Scirpus atrovirens*), and American bugleweed (*Lycopus americanus*).

Red maple-hardwood swamp communities in the Facility Site provide habitat for species that prefer moist, deciduous hardwood forests. Wildlife listed as SGCN, SSC, or T&E that could potentially utilize this ecological community include Tennessee warbler, Canada warbler, American woodcock, cerulean warbler (*Dendroica cerulea*) (SSC), black-throated blue warbler, scarlet tanager, bald eagle, Cooper's hawk, sharp-shinned hawk, wood thrush, silver-haired bat, eastern small-footed myotis, little brown myotis, and northern long-eared bat (see Table 22-5).

(3) Shrublands

Shrublands include communities that are dominated by shrubs (more than 50% cover) and may include scattered trees (Edinger et al., 2014). Within the Facility Site, shrublands occupy approximately 53 acres (3% of the Facility Site) and are dominated by varying species of shrubs and occur on a variety of soils.

*Shrub Swamp*

Shrub swamp is an ecological community dominated by shrubs and is often a transitional zone between lakes and other wetlands and adjacent uplands. On the Facility Site, shrub swamps are located in two locations; one at the northeastern end of the island, and one at the southeastern end. These ecological communities are dominated by buttonbush, colloquially referred to as buttonbush swamps. Additional plant species are present in the herbaceous layer and include American sweetflag (*Acorus americanus),* lake-bank sedge, field horsetail (*Equisetum arvense*), marsh bed-straw, sensitive fern, reed canary grass (*Phalaris arundinacea*), and water smartweed (*Polygonum amphibium*).

Shrub swamp communities in the Facility Site provide habitat for species that prefer areas of low, dense vegetation which is often inundated with fresh water. Wildlife listed as SGCN, SSC or T&E that could potentially utilize this ecological community include sedge wren, brown thrasher, American bittern, and least bittern (see Table 22-5).

*Successional Shrubland*

Successional shrubland is very limited on the Facility Site due to the effects of grazing by the deer population present on the island. Only one small area in the northeastern section of the island can be characterized as this ecological community. Shrubs present in this area include choke cherry (*Prunus virginiana*) and silky dogwood. Herbaceous species present include common knotgrass (*Polygonum aviculare*), common milkweed (*Asclepias syriaca*), enchanter's nightshade (*Circaea lutetiana*), herb Robert (*Geranium robertianum*), mouse-eared chickweed (*Cerastium fontanum*), old field cinquefoil (*Potentilla simplex*), purple giant hyssop (*Agastache scrophulariifolia*), Queen Anne's lace (*Daucus carota*), and Canada anemone.

Successional shrubland communities in the Facility Site provide habitat for species that prefer the cover low shrubs. Wildlife listed as SGCN, SSC or T&E that could potentially utilize this ecological community include red-headed woodpecker (*Melanerpes erythrocephalus*) (SSC), brown thrasher, black-billed cuckoo, and short-eared owl (see Table 22-5).

(4) Aquatic Communities

Three different types of aquatic communities as described in *Ecological Communities of New York State* (2014) were observed on Galloo Island. Two of the aquatic communities occur inland and consist of ponded waters with abundant submerged or floating-leaved aquatic vegetation and some emergent vegetation. The third community type exists along the shore of the island.

*Inland Calcareous Lake Shore*

Inland calcareous lakes shore is a community type along the gravelly, sandy, or muddy shore of lakes and ponds which are calcareous in nature. These ecological communities are sparsely vegetated and are scoured by wave action and ice. Many areas within this community type consist of bare rock. Individual trees and shrubs are opportunistically established in this community type mostly located back from the edge of the water near the transition to another community type. Occasional trees present include eastern cottonwood (*Populus deltoides*), green ash, and silver maple. Occasional shrubs present include black willow (*Salix nigra*), crack willow (*Salix fragilis*), and staghorn sumac (*Rhus typhina*). The most common herbaceous plants present along the lake shore are blueflag (*Iris versicolor*), bluegrass (*Poa* sp.), chicory (*Cichorium intybus*), riverbank grape (*Vitis riparia*), and white bedstraw.

Inland calcareous lake shore communities in the Facility Site provide habitat for species that prefer the shallow waters of lake edges. Wildlife listed as SGCN, SSC, or T&E that could potentially utilize this ecological community include the common loon (*Gavia immer*) (SSC), ruddy turnstone (*Arenaria interpres*) (SGCN), semipalmated sandpiper (*Charadrius pusilla*) (SGCN), and lesser scaup (*Aythya affinis*) (SGCN) (see Table 22-5).

*Shallow Emergent Marsh*

Similar to sedge meadows, this community type is an open canopy community with a sparse if any shrub layer present. On the Facility Site, shallow emergent marshes are located mostly on the northern portion of the island. An occasional buttonbush shrub is present in this ecological community and the herbaceous layer includes bald spike rush (*Eleocharis erythropoda*), broad-leaf cattail (*Typha latifolia*), giant burred (*Sparganium eurycarpum*), pickerel weed (*Pontederia cordata*), white water lily (*Nymphaea odorata*), reed canary grass, fowl manna grass (*Glyceria striata*), and fox sedge as dominants.

Shallow emergent marsh communities in the Facility Site provide habitat for species that prefer open wetland and marsh environments. Wildlife listed as SGCN, SSC or T&E that could potentially utilize this ecological community include the northern map turtle (*Graptemys geographica*) (SGCN), Caspian tern (*Hydroprogne caspia*) (SP), cattle egret, bald eagle, semipalmated sandpiper, least bittern, American bittern, northern pintail (*Anas acuta*) (SGCN), and American black duck (*Anas rubripes*) (SGCN) (see Table 22-5).

*Eutrophic Pond*

There is one eutrophic pond located within the Facility Site. It is located within the northeastern buttonbush swamp. This wetland area is rich in nutrients and potentially provides habitat for waterfowl and fish species. White water lily and yellow pondlily (*Nuphar variegata*) are present in this pond in addition to several types of algae.

Eutrophic pond communities in the Facility Site provide habitat for species that prefer small bodies of open water. Wildlife listed as SGCN, SSC or T&E that could potentially utilize this ecological community include the northern map turtle, bald eagle, least bittern, American bittern, cattle egret, northern pintail, and American black duck (see Table 22-5).

(b) Impact to Plant Communities

Construction and operation of the Facility will result in impacts to plant communities. These impacts include vegetation clearing and disturbance from construction, as well as permanent loss of vegetated habitats by conversion to built facilities. For the purposes of this Exhibit, the limit of impacts is defined as approximate limits of vegetation clearing and areas of anticipated soil disturbance. Facility-related impacts to all plant communities identified in the mapping of ecological communities described above in section (a) were calculated using GIS software per the following assumptions associated with the approximate limit of vegetation clearing and approximate limit of soil disturbance for each type of Facility component, or the limits of disturbance, as identified in the Preliminary Design Drawings (Exhibit 11):

**Table 22-1. Impact Assumptions.**

| Facility Components | Typical Area of Vegetation Clearing | Area of Total Soil Disturbance (temporary and permanent) | Area of Permanent Vegetation Loss |
|---|---|---|---|
| Wind Turbines and Workspaces | Up to 200' radius per turbine | Up to 200' radius per turbine | 0.20 acre per turbine (pedestal plus crane pad) |
| Access Roads | 75' wide per linear foot of road | 60' wide per linear foot of road | 60' wide per linear foot of road |
| Buried Electrical Gathering Lines | 40' wide per linear foot of line per collection line circuit | 40' wide per linear foot of line per collection line circuit | None |
| Permanent Meteorological Towers | 1 acre per tower | 1 acre per tower | 1 acre per tower |
| Collection Substation | 0.5 acre | 0.5 acre | 0.5 acre |
| Operation and Maintenance (O&M) Building | 0.75 acre | 0.75 acre | 0.75 acre |
| Laydown/Staging Areas | 5 acres | 5 acres | 0.5 acre |
| Crane Build Areas | 0.5 acre per build area | 0.5 acre per build area | None |
| Batch Plant | 5 acres | 5 acres | None |
| Mining Borrow Area | 1.5 acres | 1.5 acres | None |

These impact assumptions were used to calculate the total impact to vegetation communities that could result from Facility construction and operation. A total of up to 246 acres of vegetation will be disturbed by Facility construction (based on area of proposed vegetation clearing and/or soil disturbance). This is less than 13% of the Facility Site. Of this area, 157.5 acres (64% of disturbance) will be disturbed only temporarily, including areas where collection line is buried underground, construction staging areas, and turbine construction workspaces. Approximately 88.5 acres of vegetation will be permanently impacted and converted to built and/or developed facilities, which represents only 4.6% of the Facility Site. Permanent built facilities include turbine foundations and pads, access roads, an O&M building, meteorological tower foundations, and the collection substation.

Forest clearing impacts can be characterized as one of three types. The first is permanent loss, where forests would be replaced with built facilities (access roads, turbines, etc.). There is expected to be approximately 22 acres of forest impacted in this manner. The second is forested conversion, where forests would be cleared and maintained as successional communities for the life of the Facility (areas under the turbines, and along access roads). This type of disturbance is anticipated to result in up to 1.3 acres of impact to forests. Finally, temporary impacts are those where forest would be allowed to regrow following construction (e.g. along the periphery of access roads and turbine sites). Approximately 8.2 acres of forest will be disturbed in this manner, and allowed to regrow following construction. In

these areas, the Applicant will only remove stumps where necessary to install underground components, will not use herbicides to prevent sprouting, and will not remove trees as part of routine vegetation management during Facility operation. Ecological succession would restore the forested condition of these areas over time if left unmanaged.

Construction of the Facility will result in temporary disturbance of up to approximately 120 acres of grasslands; up to an approximately 66 acres will be permanently lost to built facilities (see Table 22-2 below). Within grasslands, construction of the Facility will result in the temporary disturbance of 98 acres of successional old field, 20 acres of cropland/field crops, 1 acre of mowed lawn, and 0.7 acre of sedge meadow. The Facility will ultimately result in the permanent loss of 46 acres of successional old field, 19 acres of cropland/field crops, 1 acre of mowed lawn, and 0 acre of sedge meadow.

Within the shrublands communities, temporary disturbance will occur to 0.1 acre of successional shrublands with an additional 0.7 acre being permanent. Only 0.1 acre of temporary impact will occur to aquatic communities (shallow emergent marsh) and no permanent loss of habitat will occur, as defined by the ecological communities mapping procedure described in section (a) above. See section (m) below and Exhibit 23(b)(4) for a discussion of impacts to surface waters, as defined by on-site wetland and stream delineations, anticipated as a result of Facility construction and operation. Temporary and permanent impacts to vegetation communities will not result in extirpation or significant reduction in any ecological community type. The temporary and permanent impacts to all ecological community types are shown in Figure 22-1 and summarized below in Table 22-2.

**Table 22-2. Vegetation Impacts**

| Cover Type | | Total Acres in Facility Site (acres) | Temporary Impact (acres) | Permanent Loss (acres) | Regenerating Forest (acres) | Forest Conversion to Successional Communities (acres) | Total Impact (acres) |
|---|---|---|---|---|---|---|---|
| Grasslands | Successional Old Field | 766.4 | 97.6 | 46.4 | - | - | 143.9 |
| | Cropland/Field Crops | 163.6 | 20.2 | 18.6 | - | - | 38.9 |
| | Mowed Lawn | 31.2 | 1.2 | 1.0 | - | - | 2.2 |
| | Sedge Meadow | 49.6 | 0.7 | 0.03 | - | - | 0.8 |
| | **Total** | **1,010.8** | **119.7** | **66.0** | **-** | **-** | **185.8** |
| Forestland | Successional Northern Hardwoods | 523.5 | 31.4 | 19.8 | 8.2 | 27.6 | 51.3 |
| | Hemlock-Northern Hardwood Forest | 62.4 | 5.2 | 1.8 | 0.8 | 4.4 | 7.0 |

| Cover Type | | Total Acres in Facility Site (acres) | Temporary Impact (acres) | Permanent Loss (acres) | Regenerating Forest (acres) | Forest Conversion to Successional Communities (acres) | Total Impact (acres) |
|---|---|---|---|---|---|---|---|
| | Red Maple-Hardwood Swamp | 117.1 | 0.8 | 0 | 0 | 0 | 0.8 |
| | Hemlock-Hardwood Swamp | 125.8 | 0 | 0 | 0 | 0 | 0 |
| | **Total** | **828.8** | **37.4** | **21.6** | **9.0** | **32.0** | **59.1** |
| **Shrublands** | Successional Shrubland | 4.0 | 0.1 | 0.8 | - | - | 0.9 |
| | Shrub Swamp | 49.1 | 0 | 0 | - | - | 0 |
| | **Total** | **53.1** | **0.1** | **0.8** | **-** | **-** | **0.9** |
| **Aquatic Communities** | Shallow Emergent Marsh | 13.8 | 0.1 | 0 | - | - | 0.1 |
| | Eutrophic Pond | 4.9 | 0 | 0 | - | - | 0 |
| | Inland Calcareous Lake Shore | 13.8 | 0 | 0 | - | - | 0 |
| | Calcareous Cliff Community | 0.5 | 0 | 0 | - | - | 0 |
| | **Total** | **33.0** | **0.1** | **0** | **-** | **-** | **0.1** |
| **Total** | | **1,925.3** | **157.5** | **88.5** | **9.0** | **32.0** | **246.0** |

An invasive species survey was conducted within the Facility Site by Environmental Design & Research, Landscape Architecture, Engineering & Environmental Services, D.P.C. (EDR) staff between July 11th and August 25, 2016 (EDR, 2016) and will be used as a baseline for future monitoring. Survey methodology consisted of walking the proposed impact areas and visually estimating cover of all New York State Department of Environmental Conservation (NYSDEC)-listed prohibited and regulated invasive plant species. These species are listed below, with botanical nomenclature and common names following the New York Flora Atlas (Weldy et al., 2015):

- pale swallow-wort (*Cynanchum rossicum*)
- Canada thistle (*Cirsium arvense*)
- garlic mustard (*Alliaria petiolata*)
- leafy spurge (*Euphorbia esula*)
- Morrow's honeysuckle (*Lonicera morrowii*)
- spotted knapweed (*Centaurea stoebe*)

- wineberry (*Rubus phoenicolasius*)

In 2008, ecological surveys were conducted in support of the State Environmental Quality Review (SEQR) of the previously proposed Hounsfield Wind Project (TES, 2009). Three invasive species, pale swallow-wort, Canada thistle, and purple loosestrife (*Lythrum salicaria*) were observed during the ecological surveys. Purple loosestrife was not found during the 2016 invasive species survey area. The findings from the 2008 study were also reviewed and summarized in the ISCP, which is as Appendix Y.

Pale swallow-wort has invaded large portions of Galloo Island, and only a few small areas on the island remain free of this species (see Figure 22-2). An Invasive Species Control Plan (ISCP) for the Facility site is attached as Appendix Y. The ISCP describes survey methods used to identify existing non-native invasive plant species within the Facility Site, Best Management Practices that will be implemented, measures to educate workers, measures to control the spread of invasive species (including construction materials inspection); target species treatment and removal; construction equipment sanitation; and restoration. Due to the pervasive status of pale swallow-wort on Galloo Island, the ISCP also focuses on control measures that would prevent spread of pale swallow-wort off of the island. In addition, the ISCP outlines post-construction monitoring to take place after the Facility is operational. The ISCP addresses both non-native invasive plant and insect species.

(c) Measures to Avoid or Minimize Plant Community Impacts

Avoidance, minimization and mitigation of impacts to vegetation have been and will be accomplished primarily through careful site planning. As a preliminary matter, both the overall size of the Facility Site and the amount of forest and wetland impacted by the Facility has been significantly reduced when compared to the earlier Hounsfield Wind Project. Of particular note, the original project would have permanently disturbed 159 acres of total land, 66 acres of forest land and 0.19 acres of wetland. By comparison, the Facility will permanently disturb 88 acres of land, 21.6 acres of forest land and 0.03 acres of wetland. By avoiding forest and wetland to the maximum extent practicable, these ecologically valuable communities within the Facility Site will be largely protected from disturbance. In addition, Facility access roads will be sited on existing island roads and trails wherever possible, and areas of disturbance will be confined to the smallest area possible. In addition, a comprehensive sediment and erosion control plan will be developed and implemented prior to Facility construction to protect adjacent undisturbed vegetation and other ecological resources (see the Preliminary Stormwater Pollution Prevention Plan [SWPPP] summarized in Exhibit 23 and contained in Appendix GG for additional detail).

Other measures to avoid, minimize or mitigate impacts to vegetation also included delineating sensitive areas (such as wetlands) where no disturbance or vehicular activities are allowed, educating the construction workforce on

respecting and adhering to the physical boundaries of off-limit areas, complying with guidance provided by Environmental Monitors, employing best management practices during construction, and maintaining a clean work area within the designated construction sites. In addition, as previously discussed in section (a) above, all plant communities identified within the Facility Site are common to New York State. Therefore, no impacts to unique or rare natural communities will result from Facility construction. Following construction activities, temporarily disturbed areas will be seeded (and stabilized with mulch and/or straw if necessary) to reestablish vegetative cover in these areas. A native seed mix will be applied to disturbed area that are not currently in agriculture to help promote regeneration of native species.

Although the seed mix that will be used in site restoration is to be determined, typical upland and wetland seed mixes that could be used are summarized below (please visit http://www.ernstseed.com/seed-mixes/ for additional detail):

- Wetland Areas – ERNST FACW Meadow Mix 122 or similar:
    - Fox sedge (31%)
    - Virginia wildrye (*Elymus virginicus*) (20%0
    - Lurid sedge (*Carex lurida*) (14%)
    - Green bulrush (5%)
    - Blue vervain (*Verbena hastate*) (4%)
    - Wood reedgrass (*Calamagrostis perplexa*) (3.5%)
    - Common rush (3%)
    - Blunt broom sedge (*Carex tribuloides*) (3%)
    - Hop sedge (*Carex lupulina*) (3%)
    - Other forbs and graminoids (each 2% or less)
- Upland Areas/Erosion Control Areas – ERNST Eastern Ecotype Native Grass Mix 177 or similar:
    - Indiangrass (*Sorghastrum nutans*) (30%)
    - Big Bluestem (*Andropogon gerardii*) (30%)
    - Switchgrass (*Panicum virgatum*) (20%)
    - Virginia wildrye (16%)
    - Autumn bentgrass (*Agrostis perennans*) (4%)

Measures that will be taken to achieve a no net increase in invasive species coverage throughout the area disturbed by Facility construction are provided in the ISCP, which is described above in section (b) and attached as Appendix Y.

(d) Aquatic Habitats, Vegetation, Wildlife, and Wildlife Habitats

Due to the long history of potential development on Galloo Island, many different support studies have been conducted in order to identify vegetation, wildlife, and wildlife habits within the Facility Site. Table 22-3 lists all such studies.

**Table 22-3. Ecological Studies Completed in Support of Wind Energy Permitting on Galloo Island**

| Study | Dates | Consultant | Location in Public Record |
|---|---|---|---|
| Spring and Summer Breeding Bird Survey | 2008 | Old Bird | Hounsfield DEIS Appendix P.3 |
| Spring Nocturnal Migrant Radar Survey | 2008 | Stantec | Hounsfield DEIS Appendix P.4 |
| Fall Nocturnal Migrant Radar Survey | 2008 | Stantec | Hounsfield DEIS Appendix P.5 |
| Spring, Summer, and Fall Diurnal Bird Movement Study | 2008 | Old Bird | Hounsfield DEIS Appendix P.6 |
| Acoustic Study of Avian Nocturnal Spring and Fall Migration | 2008 | Old Bird | Hounsfield DEIS Appendix P.7 |
| On-Site Bird Species Inventory (in the Ecological Resources Report) | 2007-2008 | Terrestrial Environmental Specialists | Hounsfield DEIS Appendix N |
| Turtle Trapping Survey (in the Ecological Resources Report) | 2008 | Terrestrial Environmental Specialists | Hounsfield DEIS Appendix N |
| Bat Risk Assessment and Pre-construction Monitoring | 2008 | North East Ecological Services | Hounsfield DEIS Appendix O |
| Winter Bird Surveys | 2007-08, 2008-2009, 2009-10 | Old Bird | Hounsfield FEIS Appendix H |
| Breeding Bird Survey | 2008, 2009 | Old Bird | Hounsfield FEIS Appendix H |
| Diurnal Bird Movement Study | 2008 | Old Bird | Hounsfield FEIS Appendix H |
| Blanding's Turtle Survey | 2009 | Terrestrial Environmental Specialists | Hounsfield FEIS Appendix G |
| Breeding Bird Survey | 2015 | Old Bird | Article 10 Application Appendix BB |
| Diurnal Movement Study | 2015 | Old Bird | Article 10 Application Appendix DD |
| Bat Survey of Galloo Island | 2015 | North East Ecological Services | Article 10 Application Appendix AA |
| Reanalysis of Galloo Island 2008 Avian Radar Data | 2017 | Stantec | Article 10 Application Appendix CC |
| Galloo Island Wind - Conservation Plan | 2017 | WEST | Article 10 Application Appendix __ |

| Study | Dates | Consultant | Location in Public Record |
|---|---|---|---|
| Avian Risk Assessment | 2017 | WEST | Article 10 Application Appendix FF |

(1) Amphibians and Reptiles

The New York State Amphibians & Reptile Atlas Project ("Herp Atlas") was a survey conducted over ten years (1990-1999), that was designed to document the geographic distribution of New York State's herpetofauna. The U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle is the unit of measurement for data collection for the Herp Atlas. No data for the Galloo Island quadrangle is available through the Herp Atlas. However, a list of amphibians and reptiles known from adjacent quadrangles has been compiled (TES, 2008) (see Appendix X).

On-site surveys were conducted by Terrestrial Environmental Specialists (TES) in 2008 for the Hounsfield Wind Farm, the predecessor to the current project on Galloo Island. The herpetofauna survey included sound and sight observations, and identified one salamander species, one toad species, four frog species, three species of turtles, and two species of snake. Based on their findings, amphibians and reptiles observed utilizing the Facility Site include eastern red-backed salamander (*Plethodon cinereus*), American toad (*Bufo americanus*), bullfrog (*Rana catesbeiana*), green frog (*Rana clamitans*), northern leopard frog (*Rana pipiens*), pickerel frog (*Rana palustris*), common snapping turtle (*Chelydra serpentina*), northern map turtle, painted turtle (*Chrysemys picta*), northern water snake (*Natrix sipedon*), and common garter snake (*Thamnophis sirtalis*). During other onsite surveys (i.e., wetland delineations) in 2016 and 2017 no additional reptiles or amphibians were observed.

Turtle trapping surveys were also conducted in 2008 at the Facility Site at the request of NYSDEC to determine whether the State-listed threatened Blanding's turtle occur on Galloo Island. The Blanding's turtle survey included over 300 trap-nights, with traps placed in suitable Blanding's turtle habitat around the island. The surveys did not uncover any evidence of this species (TES, 2009), and as indicated in the Findings Statement for the Hounsfield Wind Farm the NYSDEC determined that no further survey effort was warranted.

(2) Terrestrial Invertebrates

Based on the size of the Facility Site and on-site observation of habitat types available, a wide range of terrestrial invertebrates are likely to occur. These include a variety of insects such as butterflies, ants, bees, beetles, mosquitoes, fleas, crickets, ladybirds, fireflies, cicadas, flies, and grasshoppers. Arachnids including spiders, ticks, and mites are common throughout the Facility Site. Worms including earthworms and nematodes are common invertebrates that live in the soil. Invertebrates are important components of ecological communities within the

Facility Site because they serve a variety of ecosystems services and functions, including pollination, providing prey for birds, bats, and rodents, expediting nutrient cycling, and aerating the soil.

(3) Potential impacts to the Significant Coastal Fish and Wildlife Habitats

Significant Coastal Fish and Wildlife Habitats (SCFWH) are areas designated by the New York State Department of State (NYSDOS) that are the most important or noteworthy coastal habitats. NYSDEC manages all aspects of the SCFWH program, including evaluating and recommending areas for designation under the program. SCFWH are located within the federally-approved Coastal Area Boundary (CAB) of New York State. The Facility Site is within the Great Lakes and St. Lawrence River portion of the State's CAB. Galloo Island is not located within an SCFWH, and no SCFWH overlap the Facility Site. It should also be noted that the Related Transmission Facility (RTF) presented in a separate Article VII Application will also avoid nearby SCFWH.

Many of the islands in Lake Ontario are designated as SCFWH, including some in the vicinity of Galloo Island. The three closest SCFWH to Galloo Island are Little Galloo Island (approximately 1.1 miles from the Facility Site), Calf Island (approximately 2.1 miles from the Facility Site), and Stony Island (approximately 2.5 miles from the Facility Site). The shoals within the Stony Island SCFWH support regionally significant lake trout (*Salvelinus namaycush*) (SGCN) and smallmouth bass (*Micropterus dolomieui*) spawning habitats (DOS, 1993). The Findings Statement for the Hounsfield Wind Farm Project stated that no impacts to these habitats would result from construction or operation of the Hounsfield Wind Farm Project. This conclusion that no impacts to SCFWH will result from the proposed Facility is still valid for the current proposed Facility because no SCFWH is present at the Facility Site. As stated previously, information pertaining to the RTF and its location in relation to nearby SCFWH is included in a separate Article VII Application.

The New York State Natural Heritage Program (NYNHP) maintains data on the occurrences of significant natural communities that occur within the State. In 2008, NYNHP identified two such communities in their response to a request for data for the Hounsfield Wind Farm Project: calcareous pavement barrens and calcareous shoreline outcrop. NYNHP noted that these two ecological communities occurred on the mainland shore in the Town of Henderson. The underwater transmission line for the Hounsfield Wind Project was proposed to come onto the mainland in this vicinity. However, the proposed RTF and underwater transmission line for the proposed Facility will take a substantially different route, connecting with mainland transmission systems in Oswego. Therefore, no impacts to significant natural communities identified by NYNHP in 2008 will occur as a result of the Facility.

(4) Potential Impacts to Calcareous Shoreline Outcrops

The Ecological Resources Report from 2009 identified the calcareous shoreline outcrop community as occurring on Galloo Island. Field visits by EDR verified this community type and classified it according to *Ecological Communities of New York State Second Edition* (Edinger *et al.*, 2014) within the Inland Calcareous Lake Shore community type. This community type is generally located around the entire periphery of Galloo Island and includes areas of rocky shoreline, cliffs, sandy areas, and areas with large, flat, limestone bedrock outcrops. The Facility Site and its project components (i.e., turbines, access roads, O&M building, etc.) is located internally on Galloo Island and will not impact this community.

The proposed Facility requires a floating barge ramp and landing area for the delivery of construction materials and equipment to be moved onto the Facility Site. The small area where the floating barge ramp is proposed is located on the eastern side of the island along a narrow and low quality section of Inland Calcareous Lake Shore community type. In this area, the shoreline is relatively low and flat and appears to have been historically disturbed. At this location, there are no rocky outcrops or cliffs present. For these reasons, no impacts to calcareous shoreline outcrops are anticipated.

(5) Bat and Avian Surveys

*Bat Surveys*

Information on bats were obtained from the TES Ecological Resources Report (2009), the bat risk assessment and preconstruction monitoring report prepared for the Hounsfield Wind Farm Project DEIS, as well as acoustic and mist-netting survey studies performed in 2015 (see Table 22-3 above). These studies were completed as support for permitting of the Galloo Island Wind Facility. A discussion of the extent, methodology, and results of the above studies is presented here.

TES completed an abbreviated assessment for bat species as part of the ecological resources report conducted in 2009. Based on consultation with the NYNHP at the time, NYNHP identified the potential for two species of bat to occupy the Facility site, eastern small footed myotis (SSC) and Indiana bat (SE, FE). TES did not observe any bats on site during field visits. TES concluded that there was potential suitable summer roosting bat habitat located on Galloo Island.

In 2008, a bat risk assessment and preconstruction monitoring report was prepared for the Hounsfield DEIS. In this survey conducted by North East Ecological Services (NEES), acoustic sampling, mist-net sampling, and a habitat assessment were conducted. The habitat assessment was conducted in November 2008. Additional habitat

characteristics were noted during field visits for other surveys. Mist net surveys were conducted in June 2008 and acoustic surveys were completed from June 18, 2008 through November 20, 2008.

Two types of acoustic surveys were conducted; a long term migratory survey and a summer survey. Migratory acoustic surveys were conducted using Anabat SD1 units to record echolocating bat calls in overnight periods from 6:00 p.m. to 8:00 a.m. for a total of 159 days from June 18, 2008 through November 20, 2008. Detectors were placed on meteorological (met) towers facing downward with a Lexan deflector plate below the microphone at three height intervals; ground-level, above-canopy, and turbine-level. Acoustic calls were recorded nightly and call data were analyzed using Analook™ 4.9j software. Calls recorded on the Anabat devices were identified to bat species wherever possible. For each species or guild at each tower, mean detection rates (call/detector-night) were calculated. The results of the migratory acoustic survey showed a peak in bat activity in late July and early August. Also apparent in the results of this survey was the presence of hoary bat (*Lasiurus cinereus*) (SGCN) as the dominant bat species at the turbine-level height. Myotine bats (*Myotis* spp.) were the dominant bat species present at the ground-level height.

Summer acoustic surveys were conducted in conjunction with the mist-netting survey from June 16-21, 2008. Twelve mist-net sites and 16 acoustic sites were surveyed during this effort. A total of 214 individual bats were captured in nets over the sampling effort of 60 net-nights. All the captures were little brown myotis except for one silver-haired bat. NEES concluded in the 2008 bat assessment studies that the population of bats on Galloo Island is relatively small and dominated by little brown myotis. Additionally, it was noted that there is no evidence to suggest that Indiana bat, northern long-eared bat, or eastern small-footed myotis utilize habitat on Galloo Island during the summer (NEES, 2009).

In consultation with U.S. Fish and Wildlife Service (USFWS) an additional preconstruction acoustic survey and mist net study targeting bats was designed and conducted by NEES in June 2015. Acoustic sampling was conducted in two phases (Phase 2 Presence-Absence and Phase 3 net validation). Phase 2 was conducted in mid-June and Phase 3 in mid-August along with the mist-netting survey. Passive acoustic surveys were conducted utilized Titley™ acoustic monitors (both Anabat II and Anabat SD1 units) to record echolocating bat calls in overnight periods from 6:00 p.m. to 8:00 a.m. during Phase 2 and 7 pm to 2 am during Phase 3. Per USFWS guidelines, detectors were placed at 1.5-meters above ground level, with direct field of view (no deflector plates), and facing parallel to the ground.

Acoustic calls were recorded nightly during the summer emergence and fall migration periods, with data collected from June 16 to 19 and from August 11 to 14, 2015. Call data were downloaded from the detectors and analyzed

using EchoClass 3.0 software. All monitoring data were also analyzed using BCID East v2.7c (BCID) to meet the USFWS requirement for two independent analyses. Calls recorded on the Anabat devices were identified to bat species wherever possible. For each species or guild at each detector, mean detection rates (call/detector-night) were calculated (NEES, 2016).

The detectors measured a total of 1,778 bat call sequences in 43 detector-nights, for an average of 41.3 bat call sequences per detector-night. The majority of calls (51%) were from the eastern red bat (*Lasiurus borealis*) (SGCN). This species was also the most widely detected bat species in relation to the number of sampling sites. They were documented from 29 sites (67%) across the island and documented at 91% of the sampling sites where at least one bat was recorded. Although the automated species identification software found tentative evidence for both Indiana myotis and northern myotis on Galloo Island, most of this evidence was based on a single call sequence at a particular sampling site, and neither of these species were captured during mist-net survey efforts. No evidence of eastern small-footed myotis was detected at any of the acoustic sampling sites. Other bat species detected were big brown bats (6%, *Eptesicus fuscus*), hoary bat (5%), and silver-haired bat (4%).

*Bird Surveys*

Preconstruction surveys to determine the type and number of bird species present on or near the Facility Site were conducted on Galloo Island in support of the earlier Hounsfield Wind Energy Project and the current Galloo Island Wind Energy Facility. These surveys have been conducted over a span of years from 2007 to 2015 and by several consultants including Stantec Consulting, Old Bird Inc., and TES. See Table 22-3 above for a list of ecological studies performed on Galloo Island.

In accordance with NYSDEC *Guidelines for Conducting Bird and Bat Studies at Commercial Wind Energy Projects,* surveys providing baseline data on the bird populations and characteristics of Galloo Island were conducted by Old Bird Inc. (2009). Because avian surveys for the previously proposed Hounsfield Wind Energy Project occurred five to six years prior to the proposed Facility, the Applicant consulted with NYSDEC to determine if additional studies would be necessary. It was decided that a new breeding bird survey of the island would be carried out in 2015. In addition, NYSDEC determined that no bald eagle nest surveys were necessary because Galloo Island would be covered in the Department's spring 2015 regional nest surveys. NYSDEC subsequently confirmed that no known bald eagle nests within 10 miles of the Project in spring 2015 (email correspondence from NYSDEC received September 30, 2015) and in spring 2017 (email correspondence from NYSDEC received April 13, 2017). A second meeting with NYSDEC, the USFWS and New York Department of Public Service (DPS) occurred in early May of 2015 to finalize the preconstruction avian study plan for Galloo Island. The results of these updated surveys and the previous surveys are outlined below.

Breeding Bird Surveys

Breeding bird surveys were conducted in 2008, 2009, and 2015. The 2008 and 2009 surveys entitled, *2008/2009 Breeding Bird Study of Big Galloo Island, Jefferson County,* NY, were conducted by William R. Evans of Old Bird, Inc. for the Hounsfield Wind Project which consisted of an 84-turbine layout (Evans 2008a; Evans 2009a). Breeding bird point count surveys took place in May and June of 2008 and June of 2009 at each of the proposed turbine locations as well as several other targeted locations to capture unique or appropriate habitats not covered by the turbine location points. In addition, walking transects, targeted listening, call playback, and stationary and incidental observations were performed. The majority of point counts were conducted before 10:00 a.m. in weather conditions conducive to hearing birdsong and seeing birds move about in vegetation and in flight. All birds identified by sight or sound, including soaring raptors, waterfowl, and other fly-overs, were recorded during a 10-minute session at each survey point as well as any birds seen or heard while walking transects or otherwise.

In 2008, the surveys detected 121 species of birds and 80 of these species showed breeding behavior. The 2009 study was primarily designed to augment the breeding bird data of the grassland habitats on Galloo island. Specifically, in response to requests by the NYSDEC, to gather more information of the potential use of those habitats by New York-listed grassland bird species such as northern harrier, short-eared owl, upland sandpiper (*Bartramia longicauda*) (ST), horned lark (*Eremophila alpestris*), sedge wren, vesper sparrow (*Pooecetes gramineus*), Henslow's sparrow (*Ammodramus henslowii*), and grasshopper sparrow. The 2009 survey also verified and substantiated the point count data collected in 2008.

Species observed during the 2008 and 2009 surveys were dominated by the same species that dominate the avian populations on the mainland. These include common species such as American robin (*Turdus migratorius*), European starling (*Sturnus vulgaris*), yellow warbler (*Setophaga petechia*), and house wren (*Troglodytes aedon*). The 2008 and 2009 surveys did not observe any federally listed species. State-listed species observed included the following threatened species: northern harrier, upland sandpiper, and bald eagle. Species of special concern observed onsite included the common loon, American bittern, Cooper's hawk, common nighthawk (*Chordeiles minor*), and whip-poor-will (*Caprimulgus vociferous*). Additionally, three species listed on the USFWS 2002 Birds of Conservation Concern list for this region were observed—black-billed cuckoo, bobolink, and Canada warbler.

The *2015 Breeding Bird Study Galloo Island, Hounsfield, NY* was completed in three separate efforts on May 24-26, June 16-18, and July 16-18, 2015 (Evans, 2016). This study, which is included as Appendix AA, conducted two point counts at 31 sites for a total of 62 point counts. The point counts were conducted for 10 minutes each in weather conditions conducive to hearing birdsong and seeing birds move about in vegetation and in flight. In

addition to the point count surveys, grassland walking transects, targeted searches, audio call playback, and crepuscular listening stops were performed.

The point count surveys detected 89 species of birds present on or over Galloo Island. Sixty-seven (67) of those species were actively breeding on Galloo Island. Targeted grassland transects resulted in documenting bobolink, savannah sparrow, and eastern meadowlark in the northern grassland and grasshopper sparrow and upland sandpiper in the southern grassland. Crepuscular surveys performed documented American bittern and great horned owl (*Bubo virginianus*). Targeted searches for tree swallow (*Tachycineta bicolor*) roosts documented tree swallows utilizing the southern wetland for habitat.

Most of the species detected during the breeding bird surveys are generally common, regionally abundant, and typical of the habitats in which they were observed. Although Old Bird Inc. did not detect any federally listed endangered or threatened species, they did detect several species listed as New York State threatened or special concern. The State-threatened species included northern harrier, upland sandpiper, and bald eagle. The State species of special concern included common loon, American bittern, Cooper's hawk, common nighthawk, whip-poor-will, red-headed woodpecker, and grasshopper sparrow. The selected points sampled the various available habitats within the Facility Site, and have primary habitat characteristics representative of the Facility and surrounding areas. The surveys were timed to coincide with the peak breeding season in May and June, targeted optimal weather conditions to facilitate the maximum detection of birds, and used standard point count survey methods. Therefore, the results of the surveys provide a suitable reflection of the breeding bird community within the Facility and surrounding areas.

Avian Radar Surveys

Stantec Consulting conducted a spring and fall radar survey of bird and bat flight activity in 2008 on Galloo Island, entitled, *Spring/Fall 2008 Radar Survey Report* (Stantec 2008; Stantec 2008a). The surveys collected nightly radar signatures from birds and bats for several weeks in both the spring and the fall. Survey methods included both vertically and horizontally oriented radars as well as night vision observations using night vision goggles and a red-filtered spotlight which was directed upwards to observe migrating birds and bats directly.

The spring radar survey included 42 nights of sampling. Results from the spring study included a mean passage rate of 624 targets per kilometer per hour (t/km/hr) with a maximum passage rate of 1,630 t/km/hr on May 5, 2008. The average flight direction over Galloo Island in the spring was northeast (51°). The average nightly flight height was between 152 meters and 490 meters. The fall radar survey included 60 nights of sampling. Results from the fall study included a mean passage rate of 281 t/km/hr with a maximum passage rate of 835 t/km/hr on September

10, 2008. The average flight direction over Galloo Island in the fall was south-southwest (207°). The average nightly flight height was between 207 meters and 465 meters. The radar data shows a substantial proportion of migrants flying well above the turbine height.

Both the spring and fall radar studies performed on Galloo Island show patterns of flight height and migration passage rates similar to other surveys of the same type performed over the Northeast. The studies both make note of the fact that this data cannot be correlated to metrics of turbine collision risk given that the surveys seem to support the hypothesis that collision risk is correlated with a number of factors, e.g., local weather conditions that limit flight passage and visibility, artificial lighting, and numbers of targets observed at or below the height of proposed turbines. It is most likely that collision risk is caused by a combination of multiple factors rather than any singular metric alone.

The NYSDEC requested that the data collected during the spring 2008 nocturnal survey report be reanalyzed using statistical methods employed by the USFWS to analyze data collected for the USFWS' *Great Lakes Avian Radar Technical Report: Niagara, Genesee, Wayne and Jefferson Counties, New York*, Spring 2013 (Rathbun et al., 2016). The reanalysis was conducted subject to limitations caused by the differences in the radar technology and techniques used between the methods used to complete the two studies. The results of the reanalysis are described in Appendix BB. Due to the challenges of comparing data obtained using different sampling methods and radar technologies, comparison between the Stantec and USFWS studies are inappropriate and the statistics resulting from the reanalysis are not considered valid measures of avian or bat activity. Stantec also provides documentation in their report that there is no correlation between pre-construction passage rates and post-construction mortality rates, and so pre-construction radar is not a useful predictor of risk (Stantec 2017).

Acoustic Study of Avian Night Migration

Old Bird Inc. placed an unmanned acoustic monitoring station on Galloo Island for several weeks during the spring and fall of 2008. The study documented avian flight calls for 28 nights in the spring and 20 nights in the fall from under 700 meters for 10 hours a night beginning around sunset (Evans 2008b). The *2008 Acoustic Study of Avian Night Migration on Big Galloo Island* indicated that the vast majority of flight calls detected were from migrating songbirds. They study found over 4,000 warblers and sparrow calls were logged during the fall period on Galloo Island and over 5,000 calls were documented at similar acoustic locations on the mainland (Evans 2008b). The data from this study also shows that there is gull activity over Galloo Island all night during the breeding season, with a substantial increase at dusk and dawn. The data from the acoustic monitoring was compared to data collected from two mainland sites similar in nature, Cape Vincent and Maple Ridge. The total number of calls

recorded on Galloo Island was approximately 20% less than the two comparable sites. No federal or state T&E species were documented.

Winter Bird Surveys

Winter bird surveys were conducted in both the 2007/2008 and 2008/2009 and 2009/2010 seasons on Galloo Island. The results of the winter bird surveys are presented in the reports entitled *2007-2008/2008-2009/2009-2010 Winter Bird Surveys Big Galloo Island, NY* and are summarized as follows (Evans 2008c; Evans 2009b). During these studies, diurnal and crepuscular visual surveys were conducted to observe and count wintering raptors which may be using Galloo Island. Five surveys in the 2007/2008 season and six surveys in the 2008/2009 season were conducted. During the surveys, the perimeter of Galloo Island was traversed by snowmobile or all-terrain vehicle (ATV) and incidental observations of perched or flying raptors, waterfowl, and other birds were recorded. When possible, additional data was recorded such as species, age, sex, flight height and direction. Additional surveys from small aircraft were conducted which observed and estimated waterfowl concentrations around Galloo Island.

The most commonly observed species of raptors on Galloo Island in the 2007/2008, 2008/2009, and 2009/2010 winter surveys were rough-legged hawk (*Buteo lagopus*) and red-tailed hawk (*Buteo jamaicensis*). Both of these species utilized primarily the grassland areas along the east side and the north and south ends of Galloo Island. In the 2007/2008 season and February of the 2010 season, there were also a significant number of bald eagle observations. Waterfowl observed flying were mostly over the water on the east end of Galloo Island. Few waterfowl were observed flying over the island in either winter season.

Diurnal Movement Studies

Diurnal bird movement studies were conducted in 2008, 2009, and 2015 on Galloo Island. The results of the diurnal bird surveys are presented in the reports entitled *2008/2009 Diurnal Bird Movement Study on Big Galloo Island, Jefferson County, NY* and *2015 Diurnal Movement Study Galloo Island, Hounsfield, NY* and are summarized as follows (Evans 2008c; Evans 2009c; Evans 2015). The main purpose of these surveys was to document the usage of the airspace above Galloo Island by the birds with breeding colonies on Little Galloo Island. These species include ring-billed gull (*Larus delawarensis*), herring gull (*Larus argentatus*), double-crested cormorant (*Phalacrocorax auritus*), and Caspian tern.

In 2008, the study entailed establishing five survey points along the eastern side of Galloo Island and observing the birds that flew over within 500 meters of the survey point for a period of 20-30 minutes. Surveys were conducted in the morning, late afternoon, and early evening. In 2008, 43 days of surveys were conducted. In addition to these

point surveys, secondary roving observations of migratory land birds were conducted throughout Galloo Island. Results from these surveys showed that gulls, cormorants, and terns all crossed the island in feeding flights. While birds flew over the entire island, they were more likely to fly over either the northern or southern ends of Galloo Island.

In 2009, additional survey points on the northwest side of Galloo Island were established at the request of the NYSDEC. Eight diurnal bird movement surveys were completed on Galloo Island during the 2009 effort. These surveys documented the same patterns of movement as the 2008 survey. The 2009 report concluded that the patterns of movement established in 2008 and confirmed in 2009 likely represent annual patterns.

The 2015 survey was conducted to re-assess and bring up-to-date the results from the previous studies. Additionally, the 2015 study sought to assess whether terns from a newly formed colony of common tern (*Sterna hirundo*) (ST) on Little Gallo Island flew across Galloo Island. Survey methods followed those of the previous two studies and completed a total of 85 point surveys. This survey found observed zero instances of common tern flying over Galloo Island. Other species of birds exhibited the same patterns of flights over Galloo Island as in years past. Complete details of results from these surveys can be found in the corresponding reports in Appendix CC.

(6) Wildlife Habitat and Vegetative Communities

All of the plant community types identified in Section (a) above serve as habitat for various wildlife species including aquatic habitats, plant communities, and other habitats that could potentially support T&E, SSC, and SGCN species. Descriptions of wildlife habitat and vegetative communities associated with each individual cover type are addressed in the descriptions of plant communities in Section (a) above, rather than provided here in Section (d)(6).

(e) Species Lists

(1) Plant Inventory

The plant species inventory is described in Section (a) above, and the species list is attached as Appendix X.

(2) Wildlife Inventory

A comprehensive wildlife inventory that included both on-site observations and review of existing data sources was performed that covered the vicinity of the Facility Site. This inventory identified species that could occur in

the Facility Site at some time during the year, and is based on on-site surveys, existing data, and/or the availability of suitable habitat. The inventory identified species that could occur in the Facility Site at any time during the year. Based on this review, a total of up to approximately 210 wildlife species could use the Facility Site at some time during the year. The complete list is attached as Appendix x. The headings below discuss the methods and data sources that were used to create the wildlife inventory list.

*Mammals*

Publicly available information regarding the locations of mammalian species in New York is generally not available. However, a number of wildlife, ecological, and other studies were conducted in support of permitting for the previous Hounsfield Wind Farm Project. Occurrence of mammalian species was documented through observations during on-site field surveys for many of these studies such as wetland and stream delineations. Field observations included direct observations of individuals, as well as observations of animal signs of occurrence such as tracks or scat. Mammals also were presumed to likely inhabit Galloo Island based on an evaluation of appropriate and available habitat. Species known to occur in the Facility Site based on field observation of individuals and/or sign include white-tailed deer, eastern cottontail rabbit (*Sylvilagus floridanus*), American beaver (*Castor canadensis*), eastern gray squirrel (*Sciurus carolinensis*), red squirrel (*Tamiasciurus hudsonicus*), eastern chipmunk (*Tamias striatus*), coyote (*Canis latrans*), and a variety of mice and shrews. The list of species observed on-site is included in the Wildlife Inventory attached as Appendix X.

As previously discussed, to characterize and document bat activity within the Facility Site, NEES conducted on-site acoustic bat surveys. The methods and findings of the bat studies completed in support of the Facility are described in Section (d) above. Bat species confirmed on-site are identified in the Wildlife Inventory attached as Appendix X. The most commonly documented species included eastern red bat, little brown bat, big brown bat, and silver-haired bat (NEES, 2016).

*Birds*

To determine the type and number of bird species present within the Facility Site, existing data sources and on-site observations were compiled to generate a complete list of bird species that use the Facility Site. Sources of information are listed below, and further discussion of the databases that were queried is included below:

- NYS Breeding Bird Atlas (BBA)

  The BBA is a comprehensive, statewide survey that indicates the distribution of breeding birds in New York State. Point counts are conducted by volunteers within 5-km by 5-km survey blocks across the state (McGowan and Corwin, 2008). The Facility Site is located within or immediately adjacent to two New York State BBA blocks (3786D and 3886C). These blocks were queried for bird species occurrence data. A

total of 22 species were observed within the survey blocks (see Appendix X). All of the species were identified by one or more of the other data sources (NYSDEC, 2007).

- NYNHP Documentation of Bird Species Occurring on Galloo Island and within 10-miles
  See agency correspondence in Appendix X.
- Surveys identified in Table 22-3
  See Section (d)(5) above for discussion of these surveys.

In addition, the following databases were consulted to determine the potential occurrence of bird species on Galloo Island; however, they did not identify any species or routes that are known to occur on Galloo Island:

- USGS Breeding Bird Survey Routes,
- eBird,
- The Nature Conservancy, and
- Regional avian data (i.e., Kingbird Audubon Christmas Bird Counts [CBC] and Hawk Migration Association of North America [HMANA]).

*Fish*

In order to report all fish species that could possibly occur near Galloo Island, data were retrieved from the NYSDEC Fish Atlas Maps of New York. Because no data in the vicinity of Galloo Island has been collected in the database, fish species found in environments similar to those found on the island were included in the wildlife inventory. No streams and only one small surface water pond were identified within the Facility Site, so only fish supported by large lake environments were included. A total of 35 unique fish species were identified. These include larger fish valued by anglers such as lake trout, chinook salmon (*Oncorhynchus tshawytscha*), walleye (*Sander vitreus*), smallmouth bass, largemouth bass (*Micropterus salmoides*), and northern pike (*Esox lucius*). Smaller fish that are preyed upon by these larger fish are supported by lakes as well, including pumpkinseed (*Lepomis gibbosus*), bluegill (*Lepomis macrochirus*), shiners (*Luxilus* spp., *Notropis* spp., and other genera), and minnows (*Pimephales* spp.).

*Amphibians and Reptiles*

As stated above in Section (d), the New York State Herp Atlas was a survey conducted over ten years (1990-1999) that was designed to document the geographic distribution of New York State's herpetofauna. The USGS 7.5-minute topographic quadrangle is the unit of measurement for data collection for the Herp Atlas. No data for the Galloo Island quadrangle is available through the Herp Atlas. However, a list of amphibians and reptiles known from adjacent quadrangles were compiled by TES for the previous Hounsfield Wind Farm project.

Information on amphibians and reptiles expected to occur within the Facility Site and an evaluation of suitable habitat for these species is provided in Section (d) above.

*Terrestrial Invertebrates*

As stated above in Section (d)(3), a wide range of terrestrial invertebrates are likely to occur within the Facility Site. Since there are no databases for invertebrates, onsite observations of insects and habitat to support insects was documented. These observations indicated that a variety of insects such as butterflies, ants, bees, beetles, mosquitoes, fleas, crickets, ladybirds, fireflies, cicadas, flies, and grasshoppers occur in the Facility Site. Arachnids including spiders, ticks, and mites are common throughout the Facility Site. Worms including earthworms and nematodes are common invertebrates that live in the soil.

(f) Impacts to Vegetation, Wildlife, Wildlife Habitats, Wildlife Travel Corridors, and Protected Species

This section summarizes potential impacts resulting construction and operation of the Facility, including the following items required by Stipulation 1001.22(f):

(1) Construction- and Operation-Related Impacts to Vegetation

Impacts to wetland vegetation are addressed below in Section (m). With respect to impacts to non-wetland vegetation, construction and operation impacts are addressed above in Section (b). A total of up to approximately 246 acres (12.8% of the Facility Site) of vegetation will experience temporary disturbance as result of Facility construction. Of that amount, a total of up to approximately 89 acres (4.6% of the Facility Site) of vegetation will be permanently lost through conversion to Facility components. No plant community will be extirpated or significantly reduced as a result of the Facility. As previously noted, because Galloo Island is heavily infested with the invasive pale swallow-wort, the quality of habitat on the island is substantially degraded. The Applicant has taken measures to avoid, minimize, and mitigate vegetation impacts to the extent practicable, including reducing the number of turbines from the 32 presented in the Public Scoping Statement to the 30 turbines presented in this Application.

Other than wetland communities, no vegetative resources that would be considered sensitive are present within the Facility Site. Non-wetland vegetation that would be considered sensitive include significant natural communities, as well as any populations of federally- or state-listed threatened, endangered, candidate, or rare plant species. A review of public data was conducted to identify potential occurrences of these significant communities. The USFWS maintains an online database called the Information for Planning and Conservation (IPaC) where users can request site-specific information for known occurrences of federally-listed threatened,

endangered, and candidate species listed under the Endangered Species Act. The NYNHP tracks state- and federally-listed threatened, endangered, and special concern plant and animal species that occur throughout the State, as well as ecological communities that are unique or of special ecological significance. The Applicant requested site-specific data from both of these sources in order to determine the presence of sensitive vegetative resources that may occur in the Facility Site. No threatened, endangered, candidate, rare plant species, or significant ecological communities were identified by either the USFWS IPaC results or the NYNHP correspondence, nor were any observed during on-site ecological surveys (see Appendix X). Had the ecological surveys documented the presence of unique or significant natural communities on-site that would provide habitat to state- or federally listed plant species, rare plant surveys would have been warranted. However, all of the major plant communities found within the Facility Site are common in New York State, as indicated in section (a) above.

As indicated above, the only sensitive vegetative resources identified within the Facility Site are wetlands. As summarized in section (m) below, wetland resources were field delineated in 2016. Prior to construction, the limits of all wetlands within the vicinity of the limit of work will be clearly defined by staking or flagging boundaries with surveyor's ribbon. Where appropriate, fencing or protective barriers will be installed to ensure that construction activity does not enter the wetland resource. The method selected to define the wetland boundaries will provide the highest visibility to construction workers, while also being practical to install. Complete details of wetland impacts and wetland avoidance, minimization, and mitigation are found in sections (m) and (n) below.

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

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

*Incidental Injury or Mortality*

Incidental injury and mortality should be limited primarily to sedentary/slow-moving species such as small mammals, reptiles, amphibians, and invertebrates that are unable to move out of the area being disturbed by construction. Tree clearing will occur from October 1 to May 31, outside of the breeding period for birds and bats in order to avoid impacts to the eggs and/or young offspring of nesting birds, as well as immature mammalian species that are not yet fully mobile. More mobile species and mature individuals should be able to vacate areas that are being disturbed by construction. Vehicle-related mortality may increase temporarily due to the increased traffic during construction; however, significant impacts are unlikely given that all traffic will move on Galloo Island at low speeds.

*Silt and Sedimentation*

Earth-moving activities (including foundation excavation and back-fill, and construction of new access roads) may result in sedimentation and siltation impacts to aquatic habitat. These impacts could occur down slope of areas subject to significant earth-moving activity (e.g., turbine sites). Siltation and sedimentation of water bodies can adversely affect water quality and aquatic habitat. It can also interfere with the respiration of aquatic organisms and the survival of fish and amphibian eggs and larvae. Although these impacts are possible, they are expected to be minor due to the substantial efforts by the Applicant to avoid impacts to aquatic habitats. In addition, no rivers or streams were documented in the Facility Site and the only open water pond on the island is outside the anticipated limits of disturbance. Lastly, the Applicant will implement a series of soil protection best management practices (BMPs) during construction as outlined in the project SWPPP, thus minimizing the potential for adverse impacts to local water resulting from soil erosion and sedimentation. See the discussion of measures to avoid and mitigate impacts to surface waters in Exhibit 23(b)(5).

*Habitat Disturbance/Loss*

As mentioned previously, Facility components have been sited to minimize impact to undisturbed habitat. Many of the proposed access roads are located on existing island roads to limit the total amount of tree clearing necessary. Likewise, proposed turbines are located mostly in open canopy ecological communities. With the exceptions of turbines 14 and 15, all of the turbines are sited within successional old field or cropland/field crops ecological communities.

In total, approximately 246 acres of vegetation will be temporarily disturbed during construction, while permanent loss through conversion of natural habitat to permanent facilities will total approximately 89 acres. Ground-disturbing construction activities could also reduce the availability of stopover habitat for migratory birds within the landscape, directly through the loss of habitat and indirectly by inducing avoidance of stopover habitat in response to visual and/or noise disturbance (Strickland et al., 2011). Much of the land cover classified as grasslands on Galloo Island is moderately to heavily infested by invasive pale swallow-wort, yielding large areas of dense monocultures unsuitable for most grassland species. In addition, given the small amount of forested habitat loss, there will be minimal effect on forest species that use the island.

Changes in vegetation could influence the behavior of bats by changing microclimatic conditions and the quality of habitat for foraging or roosting bats (National Research Council, 2007). Bats may also become attracted to openings made in forested areas from tree clearing activities for turbines and access roads, as they may find foraging opportunities in the openings. It is anticipated that any bats that are present in the Facility Site would

return to areas that were temporarily disturbed following the completion of construction activity. Significant adverse impacts on bat and bird populations are not expected during construction of the Facility. Tree clearing will be conducted between October 1 and May 31, outside of the nesting season for birds and the activity period for bats.

*Displacement*

Some wildlife displacement will occur due to increased noise and human activity as a result of Facility construction. The significance of this impact will vary by species and the seasonal timing of construction activities. The species most likely to be disturbed/displaced by Facility construction include grassland bird species such as bobolink, eastern meadowlark, red-winged blackbird (*Agelaius phoeniceus*), and savannah sparrow, and forest species such as forest-dwelling warblers, ovenbird (*Seiurus aurocapilla*), and veery (*Catharus fuscescens*). Within New York State, peak breeding time for birds common to agricultural, grassland, and forest habitat occurs in late spring and early summer. If construction begins before the initiation of breeding activities, then most breeding birds would likely avoid nesting in active construction areas. If construction begins during the breeding season, then breeding birds that are accustomed to similar disturbances, such as farming and logging, are expected to remain in the area while others will likely relocate to adjacent suitable habitat, if available. These impacts are not expected to be significant because a sizable amount of suitable habitat will remain undisturbed within and adjacent to the Facility Site. As stated previously, area of required vegetation clearing and soil disturbance will be less than 13% of the entire Facility Site. Outside of localized construction disturbance and some temporary displacement in the immediate vicinity of turbines, access roads, etc., no significant displacement impacts on breeding birds are anticipated during construction.

It is anticipated that none of the construction-related impacts described above will be significant enough to affect local populations of any resident or migratory wildlife species.

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

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

*Habitat Loss*

A total of approximately 89 acres of wildlife habitat will be permanently lost from the Facility Site (i.e., converted to permanent facilities). This habitat loss represents only approximately 4.6% of the 1,929-acre Facility Site. Approximately 52% of this permanent loss (approximately 46 acres) will occur in successional old field which are dominated by pale swallow-wort and have limited wildlife habitat value. In addition, approximately 1.3 acres of

permanently-disturbed forest are expected to be converted to a successional community (old field, shrubland, or saplings) for the life of the Facility. Approximately 9 acres of forest will be temporarily disturbed and allowed to regenerate to forest. Given the relatively small area of lost or converted natural communities, habitat loss/conversion resulting from Facility development is not considered significant.

*Forest Fragmentation*

Forest habitat fragmentation consists of breaking or dividing large blocks of contiguous forest into smaller patches via clearing or canopy removal. Fragmentation can occur at a variety of scales and patterns, and can have direct impacts on habitat and biodiversity. EDR conducted a GIS analysis to determine the extent of forest fragmentation on potential "interior forest" within the Facility Site.

The methodology of this analysis is based on similar methodology EDR utilized for the Jericho Rise Wind Farm, located in Franklin County, New York. This methodology was developed based on information from the NYSDEC. Specifically, the NYSDEC submitted a comment letter on the Jericho Rise Wind Farm Supplemental Environmental Impact Statement on January 11, 2016, which states the following with respect to forest fragmentation impacts: "Indirect impacts to interior forests are difficult to quantify, though many studies have shown that measurable impacts are found at least 300 feet, and up to 2000 feet, into the forest from the boundary of a disturbance." For the purposes of this analysis and others, EDR used a distance of 1,000 feet from the forest boundary as the threshold beyond which the forest is considered interior, which would appear to represent a reasonable middle ground within the distance range identified by the NYSDEC.

As described in Section (a) above, the plant communities were mapped for all land area within the Facility Site using GIS software. Galloo Island consists of approximately 830 acres of forest. Using a distance of 1,000 feet from the forest boundary, EDR determined that one patch, or, approximately 17 acres, would be considered interior forest. While the Facility is anticipated to permanently impact approximately 21.6 acres of forestland (see Section [b] above), none of these impacts will occur within the area identified as interior forest. In general, forests in the Facility Site will remain largely intact since the Facility components have been primarily sited within the successional old field community type (see Figures 11-1 and 22-1). Based on this analysis, the Facility would not result in significant adverse impacts to interior forest conditions or result in substantial forest fragmentation.

*Disturbance/Displacement*

Habitat alteration and disturbance resulting from the operation of turbines and other wind farm infrastructure can make a site unsuitable or less suitable for nesting, foraging, resting, or other wildlife use. As mentioned above, the footprint of turbine pads, roads, and other Facility infrastructure represents a very small percentage of the site

following construction. Therefore, overall land use is relatively unchanged by wind power development. However, the true amount of wildlife habitat altered by a wind power facility can extend beyond the functional facility footprint, due to the presence of tall structures and increased human activity. The following subheadings address potential disturbance/displacement impacts to breeding birds, waterbirds, raptors, and game species.

Breeding Birds

While wildlife may become habituated to the presence of wind turbines, the rate (and degree) of habituation is currently unknown because few long-term studies have been conducted. Evidence indicates that some grassland species may be displaced or that breeding can be affected. Studies conducted at wind power projects in southwest Minnesota and in Wyoming revealed that grassland nesting birds are found in reduced numbers as the proximity to wind turbines increases (Johnson et al., 2000; Leddy et al., 1999). Post-construction surveys at the Noble Wethersfield Windpark in Wyoming County, New York, concluded that one avian species, the bobolink, showed an effect of turbine displacement following construction, with significantly fewer bobolinks within 246 feet (75 m) of turbines situated in hayfields. However, another species, the savannah sparrow, did not show a significant difference in abundance with distance from turbines (Kerlinger and Guarnaccia, 2010).

Many of the bird species documented during pre-construction surveys are common species that inhabit suburban and urban environments and are relatively tolerant to disturbance (WEST, 2017). Displacement effects are unlikely and not expected for most of the birds occurring within the Facility Site, although some permanent displacement may result to forest and grassland birds observed during the breeding bird surveys. It is unclear if displacement effects would persist of the life of the Facility, given that many species likely habituate to the presence of turbines as well as other anthropogenic disturbance (The Ornithological Council, 2007). Displacement is likely to be limited to the immediate area of each turbine, and is also likely to be influenced by other factors, such as size of field and agricultural practices. In the northeastern portion of the Facility Site, any potential impacts to grassland-nesting species are anticipated to be less than the impacts from existing agricultural activities and pesticide use in the same area. Of the remaining turbines sited in grassland areas, significant amounts of suitable adjacent grassland habitat are present. Given the small amount of habitat in which displacement could occur compared to total habitat available of Galloo Island and the tolerance many of the birds have to disturbance, any displacement of individual birds that may occur is not expected to adversely affect local population viability.

Forest and forest edge birds are not likely to be significantly disturbed because these species are familiar with tall features (i.e., trees) in their habitat (Kerlinger and Guarnaccia, 2007). A post-construction study of 11 turbines located on a ridgeline in Searsburg, Vermont, showed that some forest-nesting birds such as blackpoll warbler (*Setophaga striata*), yellow-rumped warbler (*Setophaga coronate*), white-throated sparrow (*Zonotrichia albicollis*),

and dark-eyed junco (*Junco hyemalis*) appeared to habituate to the turbines within a year of construction. The study did not document how close to the turbines these species nested, but it clearly demonstrated that forest-nesting birds foraged and sang within forest habitat about 100 feet (30 m) from the turbine bases. Other species found in pre-construction surveys, such as Swainson's thrush (*Catharus ustulatus*), were absent in the initial post-construction surveys and appeared to have been displaced by the turbines (Kerlinger, 2002). However, a subsequent visit to the Searsburg site six years later revealed that Swainson's thrushes were singing (and likely nesting) within the forest adjacent to turbines (Kerlinger and Guarnaccia, 2007). Minimal displacement in wooded areas was also documented following construction of the Noble Bliss Wind Farm in Wyoming County, New York. This study found that bird diversity rebounded following construction of the wind project, but abundance did not. These results suggest that individual species may habituate to the presence of wind turbines at different rates (Kerlinger and Guarnaccia, 2009).

Waterbirds

The potential impacts of the Facility on migrating or foraging waterfowl should not be significant. Sometimes waterbirds, such as migrating geese, forage in upland farm fields in substantial numbers. Disturbance/displacement impacts to waterbirds that use fields are not expected as a result of operating wind turbines because these birds are generally well-adapted to disturbed environments with heavy human influence (e.g., along highways, in busy public parks, often near tall buildings, etc.).

The conclusion that Facility operation is unlikely to cause significant disturbance or displacement impacts to waterbirds is supported by the results of a study conducted by the Iowa Cooperative Fish and Wildlife Research Unit at the Top of Iowa Wind Farm located in Worth County, Iowa. Due to its proximity to three state-owned wildlife management areas, the Top of Iowa Wind Farm experiences very high use by waterfowl (over 1.5 million duck and goose use-days per year). Observations at that site revealed that wind turbines did not affect the use of the fields by Canada geese (*Branta canadensis*) or other species of waterfowl. In addition, over the two-year course of the study, no turbine-related waterfowl or shorebird mortality was documented (Koford et al., 2005). Based on these study results and the fact that the wind turbines are generally not near waterbird habitat, the proposed Facility is not anticipated to have a significant, long-term displacement or mortality effect on resident or migrating waterfowl.

Raptors

Raptors may experience some displacement due to the loss and fragmentation of habitat from the construction of the Facility. A study conducted at a 129 MW wind farm in Wisconsin measured use by raptors at the site both pre- and post-construction. Species observed during the study (either pre-construction, post-construction, or both)

included American kestrel, bald eagle, broad-winged hawk (*Buteo platypterus*), great horned owl, northern harrier, osprey (*Pandion haliaetus*), peregrine falcon (*Falco peregrinus*), red-shouldered hawk (*Buteo lineatus*), red-tailed hawk, turkey vulture, as well as a few unidentified accipiter and buteo hawk species. This is a similar suite of species to those identified at the Facility Site (see Section (d)(5) for more information on raptor species observed in the Facility Site). The study found that the abundance of raptors in all species groups was lower in the first year of post-construction monitoring than it was pre-construction. American kestrel, red-winged hawk, and turkey vultures experienced the greatest declines; however, annual fluctuations in raptor use is common and it is unclear if this was caused by the wind facility or was a result of annual variation in abundance (Garvin et al., 2011). It is possible that raptor activity may be reduced by the presence of the Facility.

Game Species

While habituation to the presence of the turbines may not be immediate, game species such as deer and wild turkey generally adapt quickly to the presence of man-made features in their habitat (as evidenced by the abundance of these species in suburban settings). Significant displacement of game species from the Facility Site is not expected to occur.

*Bird and Bat Collision Risk*

Avian fatality rates have been fairly consistent across the U.S. at most wind energy facilities. An evaluation of 63 studies across the U.S. of avian fatality found that fatality rates at 36 projects ranged from less than 0.50 birds/MW/year to approximately 14.0 birds/MW/year. However, the majority of the studies (42 of the 63 studies) reported bird mortality rates of three birds/MW/year or fewer (Strickland et al., 2011). Post-construction mortality surveys conducted at a nearby wind farm on Wolfe Island in Ontario, Canada, reported bird fatality rates of 6.38 birds/MW/year in 2010 and 2.47 birds/MW/year in 2011 (Stantec 2011, 2012). Given that the overall size of Galloo Island is much smaller and and that much of the grassland habitat on Galloo Island is not suitable habitat because of the presence of the invasive pale swallow-wort plant, it is likely that the risk of wind turbine-related fatalities would be much lower at Galloo Island (WEST, 2017). The following subheadings address potential collision risks to migratory land birds, waterbirds, and raptors. In addition, the Applicant will conduct post-construction bat and bird fatality monitoring which will quantify fatalities caused by the Facility. See Section (h)(3) below for details on the Post-Construction Monitoring Plan.

Land Birds

Bird fatality rates have been observed to peak during the spring and fall migration seasons at most wind energy facilities (Johnson et al., 2002 and Erickson et al., 2014). Passerines are considered susceptible to collisions with manmade structures during nocturnal migration, and may be more vulnerable during inclement weather conditions

when birds may be flying at lower heights than normal and may become disoriented from decreased visibility and artificial light sources (Kerlinger, 1995). Large-scale night migration-related mortality events of the type seen at communication towers are rare at wind energy facilities. Generally, the few large-scale mortality events documented at wind energy facilities have been determined to be due to improper lighting. Measures for facility lighting have since been developed to minimize such avian attractants (Stantec, 2011 and Young et al., 2004). The Applicant has committed to implementing a light management plan (downward facing and motion-activated lights as practicable, intermittent Federal Aviation Administration lighting, etc.) that will reduce collision risk for migratory land birds in the Facility area (WEST, 2017).

Waterbirds

Although waterfowl do not seem especially vulnerable to turbine collisions and significant impacts are not likely based on available evidence, fatalities have been reported at wind energy facilities located on the shores of large, open expanses of water (Erickson et al., 2002). At the Facility, waterbird use was specifically studied during at least six winters between 2007 and 2015. Waterfowl use of the island during spring and fall migration was low, and most waterfowl flight activity observed at Galloo Island was over the water along the east end of the island with very few waterfowl observed flying directly over the island. Gull and double-crested cormorant flight activity in the vicinity of Galloo Island typically begins in mid-March. Passage rates peak from late June through early July, and taper off by early August when the bulk of the Little Galloo gull colony disperse. Shorebirds were not seen in active migration during any surveys, but many species of migrant (nonbreeding) shorebirds were found feeding on Galloo Island. Several of these species were seen flying over the interior of the island. The Facility will generally pose a low risk to waterbirds since the available data suggests that collision impacts for these bird types are low and since most of the waterbird observations were along the shorelines or over the water and not over the island where turbines will be located.

Raptors

Although raptor use of the Facility was observed to be moderate during winter surveys, raptor breeding events are uncommon on Galloo Island. High concentrations of raptors during migration are not expected as raptors typically do not migrate over large expanses of water. The most frequently observed raptor species were rough-legged hawk and red-tailed hawk, both of which are relatively common species. In New York, post-construction monitoring data available from 10 facilities revealed that raptor mortality averaged 0.12 raptors/MW/year and ranged from zero to 0.59 raptors/MW/year (Jain et al., 2009a, 2009b, 2009c, 2009d, 2010a, 2010b, 2010c, 2011a, 2011b, 2011c; Stantec 2009, 2010, 2011; Tidhar et al. 2012a, 2012b, 2013). Given the moderate raptor use at the Facility Site, and the results of mortality monitoring studies at other New York wind facilities, raptor fatality rates at the

Facility are expected to be similar to those at other northeastern wind facilities and unlikely to adversely impact raptor populations.

(4) Construction- and Operation-Related Impacts to Wildlife Travel Corridors

Galloo Island is located in Lake Ontario several miles off shore from the mainland. During spring and fall migration birds travel over the Facility Site. Travel corridors on Galloo Island were studied during the 2008 and 2009 diurnal bird movement studies. The studies found that colonial waterbirds, including ring-billed gulls, Caspian terns, and double-crested cormorants fly from Little Galloo Island across Galloo Island regularly in order to access feeding grounds, with the middle portion of the island used less frequently than either the northeast or the southwest ends of the island. The Findings Statement for the previous Hounsfield Wind Farm Project concluded that there was some potential for collision fatalities of ring-billed gulls and Caspian terns. However, according to the Findings Statement, the number of collision fatalities anticipated to result from Caspian tern collisions with wind turbines was not expected to be significant. Double-crested cormorants were not anticipated to have high collision mortality, based on their low flight heights. Although the Facility could result in collision impacts where waterbirds cross the island, the Findings Statement previously determined that impacts are not expected to be significant.

Smaller scale travel corridors that are not used for migration but are used for local movement between resource patches likely exist within the Facility Site. These include deer trails, areas between wetlands and uplands that reptiles and amphibians cross to access breeding grounds, and large patches of forest that mammals may travel through while foraging. As stated above, the Facility Site is a mosaic of forested and open canopy communities with an understory dominated by pale swallow-wort. Moreover, the limits of disturbance will be sited along existing roads and trails and outside of forested communities wherever possible. Although construction and operation of the Facility could have some minor impacts on travel corridors in forested areas of the Facility Site, these forested areas are not unique, are heavily dominated by pale swallow-wort, and wildlife with preferences for forested habitats are likely to find alternative travel corridors in adjacent similar habitat. Many species (e.g., whitetail deer, coyotes, various birds, rodents) will be able to continue to use existing travel corridors even if Facility construction and operation result in some breaks in forested cover. For these reasons, impacts to wildlife travel corridors are expected to be minimal.

(5) Threatened, Endangered, and Special Concern Species

The Applicant compiled a list of State- and federal-listed species that could occur in the Facility Site based on a site-specific correspondence and database queries from USFWS, the NYNHP, NYSDEC State and regional offices, and direct observations made on-site. The USFWS maintains an online database called the IPaC where

users can request site-specific information for known occurrences of federally-listed threatened, endangered, and candidate species listed under the Endangered Species Act. NYNHP tracks threatened, endangered, and special concern plant and animal species that occur throughout the State, as well as ecological communities that are unique or of special ecological significance. The Applicant requested site-specific data from both of these sources in order to determine the presence of threatened, endangered, candidate, or special concern species that may occur in the Facility Site (see Appendix X). Additionally, of the list of species observed during the 2008, 2009 and 2015 on-site surveys, the Applicant identified those species listed federally or at the State level. Table 22-5 provides the list of all species identified through these methods, as well as a brief description of the ecological requirements, the source of information concerning the possible presence of the species within the vicinity of the Facility Site, and whether the species was physically observed during on-site surveys. Pursuant to Part 182 of 6 New York Code Rules and Regulations (NYCRR) the Applicant has determined that a take of a listed species is likely to occur and as such an Incidental Take Permit (ITP) Application is included as Appendix DD. The ITP defines the potential disturbance to each listed species determined to be at risk, as well as avoidance, minimization and mitigation measures that will be taken to demonstrate a net conservation benefit to these species (see Section (h)(3) below for a more detailed discussion of the ITP).

From the above sources, it was determined that no federally-listed endangered species were observed within the Facility Site. Three State-listed threatened species (bald eagle, northern harrier, and upland sandpiper) were found within the Facility Site. One State-listed endangered species (short-eared owl) and one State- and federally-listed threatened species (northern long-eared bat) have the potential to use the Facility Site. The NYSDEC also keeps records on species of special concern. These species are not listed, but their conservation needs do "warrant attention and consideration" (NYSDEC, 2016d). Nine species of special concern were identified either through site-specific correspondence with NYNHP or through direct observation on-site (common loon, American bittern, cerulean warbler, Cooper's hawk, red-headed woodpecker, golden-winged warbler (*Vermivora chrysoptera*) (SCS), grasshopper sparrow, sharp-shinned hawk, and eastern small-footed myotis). NYNHP also indicated that two protected bird species (Caspian tern and cattle egret) are located within ten miles of the Facility Site. An additional protected bird species, the great blue heron (*Ardea herodias*) (SP) was observed on site by TES in 2009. Although these species are not listed, they are considered protected under New York State law, and may not be hunted or taken at any time in New York State.

New York State maintains a Comprehensive State Wildlife Strategy that includes a list of Species of Greatest Conservation Need (NYSDEC, 2016e). This list includes species that are rare or declining, and divides species into three categories. The first is Species of Greatest Conservation Need – High Priority (SGCN-HP). The status of these species is known and conservation is needed within the next ten years. The second category is Species

of Greatest Conservation Need (SGCN). The status of these species is known, and conservation action is needed, although need for conservation action is not as imperative as for those in the High Priority category. The third category is Potential Species of Greatest Conservation Need (PSCGN). These are species whose status is poorly known, but there is an identified threat to the species, or features of its life history make it vulnerable to threats. With the exception of the great blue heron, Cooper's hawk, and sharp-shinned hawk, all of the species mentioned above are identified as SGCN or SGCN-HP in addition to being listed as threatened, endangered, special concern, or protected. A total of 30 additional species identified from the above sources that are not listed as threatened, endangered, special concern, or protected are listed as SGCN or SGCN-HP (see Table 22-5).

The Applicant is voluntarily electing to pursue ITP under New York State Environmental Conservation Law (ECL) Section 11-0535 and 6 NYCRR Part 182 for the Facility. The Galloo Island Conservation Plan (WEST, 2017), included as Appendix DD to this Application, was developed to quantify the potential impact of Facility construction and operation on State T&E species and describes impact mitigation measures to ensure a net conservation benefit for the following species: northern long-eared bat, bald eagle, northern harrier, upland sandpiper, and short-eared owl. The Applicant is requesting an ITP for the species listed above. Table 22-4 lists the estimated take based on a 30-year lifespan of the Facility and the following sections provide details for each species.

**Table 22-4. Covered Species Potentially Impacted by the Facility**

| Species | New York State Status | Total for Life of Facility |
|---|---|---|
| Northern long-eared bat | Threatened | 9 |
| Bald eagle | Threatened | 3 |
| Northern harrier | Threatened | 3 |
| Short-eared owl | Endangered | 2 |
| Upland sandpiper | Threatened | 2 |

Northern long-eared bat

Probable summer absence of northern long-eared bat on the island has been established via onsite surveys in 2008 and 2015 (NEES 2009, 2016), and presence of the species is therefore not expected going forward. Regional studies have shown that the risk to northern long-eared bats associated with the operation of turbines is low. The USFWS stated in their final 4(d) rule regarding the northern long-eared bat, that despite variability in the data "northern long-eared bats were rarely detected as [collision] mortalities, even when they were known to be common on the landscape around wind-energy facilities" (81 Fed. Reg. 1906, January 14, 2016). The low level of recorded and anticipated collision mortalities at wind-energy facilities led them to conclude that "there is no evidence suggesting that effects from wind-energy development has led to significant declines in this species," and "with

the adoption by wind-energy facilities of the new voluntary standards, risk to all bats, including the northern long-eared bat, should be further reduced" (81 Fed. Reg. 1906, January 14, 2016). Therefore, it is not anticipated that such low levels of take resulting from the operation of the Facility will have a measurable adverse effect on the northern long-eared population or that the Facility alone would jeopardize the continued existence of the species, and extremely low levels of mitigation, if any, would be necessary to ensure a net conservation benefit to the species.

To mitigate for potential Facility impacts to northern long-eared bats on Galloo Island, the Applicant proposes to curtail the operation of turbines at wind speeds below 5.0 meters/second (m/s) during the summer roosting season through fall migration (July through September). To date, most, if not all, of the documented northern long-eared bat fatalities caused by wind energy facilities have occurred during this timeframe at wind speeds below 5.0 m/s. Therefore, this mitigation strategy is expected to remove nearly all risk to northern long-eared bats.

To ensure a net conservation benefit, one or more of the following measures may be implemented; to protect, enhance, or restore northern long-eared bat habitat by tree planting and management, installation of habitat features (e.g., BrandenBark©), mowing around trees to reduce competition and impede weed growth, stand thinning, girdling to create roost trees, understory thinning, invasive species control, prescribed fire, selective harvesting, supplemental plantings, and/or installing gates on caves that are known northern long-eared bat hibernacula to prevent human and/or predator entry. The Applicant may instead or also proposecapture-and-telementry surveys to locate previously unknown hibernacula or maternal roosts for additional protection. Regardless of the success of these capture-and-tag surveys in locating previously unknown hibernacula, the NYSDEC has indicated that the data from these efforts has conservation value in that it can be used to advance future conservation efforts for northern long-eared bats (NYSDEC, 2017). Lands utilized for conservation or capture and telemetry work would be determined in coordination with NYSDEC. Such an amount is sufficient to offset the low levels of take anticipated for this species, as enhancement of habitat to result in one new maternal roost, or protection of one existing roost or hibernacula, would more than mitigate the low levels or take expected for the project and result in a net conservation benefit to the species.

Bald eagle

Bald eagles in the Northeast have been making a steady recovery since protections were put in place in the 1970s and the evidence suggests that impacts to bald eagles will likely be low for the Facility and at levels consistent with a stable or increasing local area population. No net loss to the local area population would occur as a result

of this low level of loss to the population; therefore, mitigation is not necessary to ensure a stable or increasing bald eagle population. Nonetheless, the Applicant has proposed several minimization measures to avoid, minimize and mitigate this unlikely scenario and ensure a net conservation benefit in accordance with ECL Article 11 requirements.

To mitigate for potential Facility impacts to bald eagles on Galloo Island, the Applicant proposes to implement management actions associated with white-tailed deer (Odocoileus virginianus) hunting on the island. These actions would include using only nonlead ammunition to reduce lead exposure in the eagles scavenging carcasses, and the removal of deer offal and carcasses that may attract eagles to the interior of the island and cause increased risk or exposure to operating turbines. Lead exposure via spent ammunition is a well-documented source of anthropogenic eagle toxicity and mortality (e.g., Hunt et al. 2006, Bedrosian et al. 2012, Haig et al. 2014). Any eagles that forage on unrecovered hunter-killed species (e.g., deer, turkeys, small game, beaver) or on offal and carcasses remaining after field dressing killed with lead ammunition on Galloo Island, are exposed to lead. Bits of lead bullets or shot consumed along with the meat break down quickly in an eagle's stomach and enter its bloodstream, resulting in elevated lead levels that can cause blindness, paralysis, lack of appetite and neurological problems that make eagles more likely to fly into structures (e.g., buildings, transmission lines, and possibly wind turbines), or to be struck by vehicles (e.g., cars, trains, etc.), if they don't succumb to lead poisoning first. Although the extent of impact of this exposure on the eagles using Galloo Island is not documented, lead toxicity is a common problem in eagles in New York in general (Hadlock, 2017 ) and it is reasonable to assume that it occurs in the Galloo eagle population and that removing this environmental contaminant from the Galloo Island ecosystem would provide a net conservation benefit to the local population and reduce likelihood of neurological problems that could increase collision risk. This, coupled with risk reduction measure of making offal and carcasses unavailable to scavenging eagles, which would reduce eagle use of the interior of the island, would reduce risk and potential impacts associated with the project.

Grassland Species

Northern harrier

The New York population and distribution of northern harrier has been relatively stable since 1985. While habitat loss continues to be the primary threat to the species, the proposed Facility would only result in the loss of 3.4% of grassland habitat on Galloo Island, the majority of which is infested with pale swallow-wort. Galloo Island represents less than 1% of New York's known or likely northern harrier breeding sites (McGowan and Corwin 2008), and studies at the Wolfe Island Wind Project and Maple Ridge Wind Project suggest that wind turbines do not displace northern harriers (Jain et al. 2007, 2008; Stantec Ltd. 2014).

Northern harrier populations on Galloo Island may be affected by fluctuations in prey populations, but it is likely that the island can only support a few breeding pairs of harriers in any given year (Old Bird Inc., 2009). Compared to the Wolfe Island Wind Project, where northern harrier populations fluctuate between 50 and 150 individuals a year over a large area (Stantec Ltd., 2014c), the risk of turbine-related fatalities would be much lower at Galloo Island given the inherently low breeding density resulting from the limited habitat onsite, fewer turbines, and the smaller size of the Facility area. Given that wind turbines are believed to pose a low risk of collision and displacement of this species, it is likely that the proposed Facility would not result in any take of this species; however, in the event that take does occur, it would not threaten the viability of this species in New York or in the Facility vicinity.

Short-eared owl

The breeding population of short-eared owls in New York is threatened by loss of open grassland habitats and reforestation, but the proposed Facility would only result in the permanent loss of 3.4% of possible short-eared owl habitat on Galloo Island, the majority of which is highly infested with invasive pale swallow-wort. Only one short-eared owl has been observed on the island since 2007 despite monitoring efforts that began in 2007 to specifically target the species and the presence of its preferred prey species. Given the absence of breeding and resident populations of short-eared owls on Galloo Island, the primary risk of wind turbine collision fatalities, if any, would likely be during migration periods as the species moves to and from other known breeding sites, such as Wolfe Island.

Though the evidence does not suggest that the local short-eared owl population will be impacted by the Facility, it is possible that take could occur at very low levels, if at all, of approximately one short-eared owl for the life of the Facility, most likely during years of high prey density or possibly during migration. The Applicant has proposed to minimize impact to suitable habitat and mitigate potential impacts through land conservation, as described above for the northern harrier.

Upland sandpiper

While the upland sandpiper population in New York has experienced declines over the past few decades, and habitat loss continues to be a primary threat to the species, the species has demonstrated resilience to habitat disturbance, for example at the Wolfe Island Wind Project (Stantec, 2011c). The Facility conservatively would only result in the loss of 3.8% of the suitable grassland habitat on Galloo Island, much of which is infested with invasive pale swallow-wort. Moreover, the island only represents 1% of New York's known breeding sites for the species (McGowan and Corwin, 2008); no take is expected based on the habitat loss. In 2015, only a single upland sandpiper was detected at one out of 31 survey points during breeding bird surveys (Old Bird Inc., 2016), indicating

that the distribution and continued use of the island by the species is very limited compared to other species on the island. Because regional data from the nearby Wolfe Island Wind Project suggest that the presence of wind turbines would not likely compromise these breeding sites (e.g., breeding pair densities did not change as a function of proximity to wind turbines), coupled with the fact that turbines are sited outside the limited suitable habitat, the Facility is unlikely to impact the species. Additionally, three years of post-construction monitoring for wind turbine-related bird fatalities at the Wolfe Island Wind Project documented one upland sandpiper fatality per year (Stantec Ltd., 2010a, 2010b, 2011a, 2011b, 2011c, 2012, 2014); however, the breeding population densities of upland sandpipers both pre- and post-construction are significantly higher than those found on Galloo Island. The Wolfe Island turbines are placed in suitable breeding/nesting habitat, whereas the proposed turbine locations on Galloo Island avoid the potentially suitable breeding habitat on the island, further reducing the risk to the species from the Facility.

Given the above considerations, it is unlikely that the proposed Facility would result in any take of this species or threaten the viability of this species in New York or in the vicinity of the Facility.

Grassland Species Mitigation: To mitigate for potential Facility impacts to northern harrier, short-eared owl and upland sandpiper, the Applicant proposes to fund a specific conservation project to benefit the grassland Covered Species in consultation with the NYSDEC upon permit issuance. The goal of the mitigation project is to contribute to the conservation of Covered Species by protecting or enhancing suitable habitat for the Covered Species on mitigation land over the term on the permit. The Applicant will work with NYSDEC or other conservation entity to identify property, ideally within 97 km (60 mi) of the Facility, that can either be purchased in fee or for which a conservation easement preventing development can be purchased, to protect the land and associated wildlife habitat for the life of the Facility, or it will work with NYSDEC to identify land currently under the ownership and management of a conservation organization that would benefit from funding to enhance the property for wildlife value consistent with the value to Covered Species. Both options would potentially provide significant conservation value to the Covered Species. Additional detail is provided in the conservation plan in Appendix DD.

**Table 22-5. New York State Special Status Species Occurring or with Potential to Occur within the Facility Site**

| Species | NYS Status | SGCN Status[1] | Ecology | Source[2] | Observed on-site? |
|---|---|---|---|---|---|
| Common Tern *Sterna hirundo* | Threatened | SGCN | Found in beach habitats along lakes and coastal waters. Suitable habitat is present within the Facility Site and surrounding Lake Ontario. Not observed on-site. | NHP FWS | No |
| Short-Eared Owl *Asio flammeus* | Endangered | SGCN-HP | Found in open country, such as prairie, meadows, marshes, and open woodland. More common as a winter resident in New York State. Documented during 2008 on-site surveys. | TES NHP FWS | Yes |
| Indiana Bat *Myotis sodalis* | Endangered[3] | SGCN-HP | Winter hibernacula consist of caves or abandoned mines with stable temperature and humidity. Summer habitat consists of forested areas with loose tree bark on dead or dying trees. Foraging habitat is typically around rivers, lakes and uplands. Suitable habitat is present within the Facility Site. However, this species was not observed on site. | NHP NEES | No |
| Sedge Wren *Cistothorus platensis* | Threatened | SGCN-HP | Usually found in moist, tall-grass meadows with scattered bushes. Suitable habitat is found within the Facility Site. Not observed during on-site surveys. | NHP | No |
| Upland Sandpiper *Bartramia longicauda* | Threatened | SGCN-HP | Found in open meadows, pasture, and grass and forb mixed fields. Suitable habitat is present within the Facility Site but is reduced due to pale swallow-wort infestation. Observed during on-site surveys. | TES NEES NHP | Yes |
| Northern Long-Eared Bat *Myotis septentrionalis* | Threatened[4] | SGCN-HP | Winter habitat is caves where temperature and moisture remain even. Summer roost habitat consists of trees with cracked or exfoliating bark, and summer foraging habitat consists of forest understories. Suitable habitat is present within the Facility Site. However, no direct evidence of the species was detected during the acoustic and mist net surveys. | NHP NEES | No |
| Bald Eagle *Haliaeetus leucocephalus* | Threatened | SGCN | Usually breeds in riparian and lacustrine habitats. Preferentially roosts in conifers. May transiently utilize habitat within the Facility Site. Bald eagles were observed as non-breeding during 2015 breeding bird surveys in addition to other on-site surveys. | TES EDR OB | Yes |
| Northern Harrier *Circus cyaneus* | Threatened | SGCN | Found in meadows, grasslands, marshes, and cultivated fields. Nests on the ground, often in shrubby habitat. Suitable habitat for this species occurs within the Facility Site. Observed during on-site surveys. | TES NHP BBA | Yes |
| Pied-billed Grebe *Podilymbus podiceps* | Threatened | SGCN | Habitat includes ponds, lakes, and marshes. Marginal suitable habitat is present within the Facility Site and surrounding Lake Ontario. Not observed on site. | NHP FWS | No |
| Lake Sturgeon *Acipenser fluvescens* | Threatened | SGCN | Occur in freshwater lakes and large rivers, shorelines of the Great Lakes. Potential suitable habitat could be found in shorelines of Galloo Island. Not observed on-site. | FA | No |
| Red-Headed Woodpecker *Melanerpes erythrocephalus* | Special Concern | SGCN-HP | Habitat includes groves of tall trees, agricultural lands, clearings in woods. Breeding habitat is characterized by the presence of dead trees for nest sites, snags for roosting, and open ground for foraging. Suitable habitat is present within Facility Site. Observed during on-site surveys. | TES OB NHP | Yes |
| Golden-winged Warbler *Vermivora chrysoptera* | Special Concern | SGCN-HP | Habitat includes open woodlands, brushy clearings, and undergrowth. Suitable habitat is present within the Facility Site. Not observed on-site. | FWS | No |
| Grasshopper Sparrow Ammodramus savannarum | Special Concern | SGCN-HP | Habitat includes grasslands, hayfields, and prairies. Suitable habitat is present within the Facility Site. Observed in 2015 during transect survey for breeding bird survey. | OB | Yes |

| Species | NYS Status | SGCN Status[1] | Ecology | Source[2] | Observed on-site? |
|---|---|---|---|---|---|
| American Bittern *Botaurus lentiginosus* | Special Concern | SGCN | Habitat includes marshes and reedy lakes. Suitable habitat is present within the Facility Site. Observed during on-site surveys and incidental observation during the 2015 breeding bird survey. | TES OB FWS | Yes |
| Cerulean Warbler *Dendroica cerulea* | Special Concern | SGCN | Found in deciduous forests and river valleys. Breeds in mature hardwood forests along streams or uplands. Suitable habitat found within the Facility Site. Observed during 2008 on-site surveys. | TES | Yes |
| Common Loon *Gavia immer* | Special Concern | SGCN | Breeds on remote, undisturbed lakes. Winter and migration habitat includes lakes, rivers, estuaries, and coastlines. Suitable habitat is present within the Facility Site. Observed during TES on-site surveys and observed as non-breeding during 2015 breeding bird studies. | TES OB | Yes |
| Cooper's Hawk *Accipiter cooperii* | Special Concern | N/A | Forest-dwelling raptor that breeds in deciduous, mixed, and coniferous forests. Suitable habitat for this species occurs within the Facility Site. Incidentally observed during summer breeding bird surveys. | OB | Yes |
| Sharp-Shinned Hawk *Accipiter striatus* | Special Concern | N/A | Forest-dwelling raptor found in deciduous or mixed woodlands. Suitable habitat for this species is within the Facility Site. Observed during 2008 on-site surveys. | TES | Yes |
| Eastern Small-footed Myotis *Myotis leibii* | Special Concern | SGCN | Winter habitat includes caves and mines, more tolerant to cold than other bat species. Summer roosts consist of hollow trees, under loose bark, cracks and crevices in rock walls. Suitable summer habitat is found within the Facility Site. No evidence observed during on-site bat surveys. | NHP | No |
| Great Blue Heron *Ardea herodias* | Protected | N/A | Found in wetland habitats including marshes, riverbanks, lakes, and ponds; they occasionally forage in grasslands and agricultural fields. Observed during 2008 on-site surveys. | TES | Yes |
| Brown Thrasher *Toxostoma rufum* | N/A | SGCN-HP | Found in shrublands, dense regenerating woods, and forest edges. Suitable habitat is present within the Facility Site. Found at a total of 13 point counts during breeding bird surveys and observed during 2008 on-site surveys. | TES OB | Yes |
| Bobolink *Dolichonyx oryzivorus* | N/A | SGCN-HP | Prefers tall grasslands, including pastures, old fields, and meadows. Suitable habitat is present within the Facility Site. A total of nineteen observations during 2015 spring breeding bird surveys and 2008 on-site surveys. | TES OB BBA | Yes |
| Eastern Meadowlark *Sturnella magna* | N/A | SGCN-HP | Habitat consists of grasslands, including farm fields, old fields, meadows. Suitable habitat is present within the Facility Site. Incidentally observed during 2015 breeding bird surveys and on-site surveys. | TES OB BBA | Yes |
| American Black Duck *Anas rubripes* | N/A | SGCN-HP | Found in marshes, bays, ponds, rivers, and lakes. Suitable habitat is present within the Facility Site and surrounding Lake Ontario. Observed during 2008 on-site surveys. | TES | Yes |
| Little Brown Myotis *Myotis sodalis* | N/A | SGCN-HP | Uses a variety of forest types including deciduous, mixed, and coniferous. Roosts in trees, buildings, and piles of wood. Frequently forages over wetlands and open water. Suitable habitat found within the Facility Site. At least 13% of myotine bats calls identified during on-site bat survey. | NEES | Yes |
| Semipalmated Sandpiper *Calidris pusilla* | N/A | SGCN-HP | Habitat includes beaches and mudflats. Suitable habitat is present within the Facility Site. Observed during the 2008 on-site surveys. | TES | Yes |
| Black Tern *Chlidonias niger* | N/A | SGCN-HP | Can be found in fresh marshes, lakes, and during migration in coastal waters. Suitable habitat is present within the Facility Site and surrounding Lake Ontario. Not observed on-site. | NHP FWS | No |

| Species | NYS Status | SGCN Status[1] | Ecology | Source[2] | Observed on-site? |
|---|---|---|---|---|---|
| Olive-sided Flycatcher *Nuttallornis borealis* | N/A | SGCN-HP | Habitat includes conifer forests, burns, and clearings. Typical habitat is not present within the Facility Site. Not observed on-site. | FWS | No |
| Bay-breasted Warbler *Dendroica castanea* | N/A | SGCN-HP | Prefers woodlands and conifers in summer. Where conifers are not found, will nest in deciduous or mixed second growth woodlands. Mostly a migratory species in Facility Site region. Suitable habitat is present within the Facility Site. Observed during 2008 on-site surveys. | TES | Yes |
| Canada Warbler *Wilsonia canadensis* | N/A | SGCN-HP | Found in forest undergrowth and shady thickets. Breeds in mature mixed hardwoods of extensive forests and streamside thickets. Suitable habitat is marginal within the Facility Site. Observed during 2008 on-site surveys. | TES FWS | Yes |
| Threespine Stickleback *Gasterosteus aculeatus* | N/A | SGCN-HP | Occur in coastal streams, ocean, and large inland lakes; widespread in Lake Ontario. Habitat includes well vegetated areas with muddy or sandy substrate. Suitable habitat occurs in Gill Harbor. Not observed on-site. | FA | No |
| American Kestrel *Falco sparverius* | N/A | SGCN | Generally, occupy open areas with few trees, such as grasslands and agricultural fields. Suitable habitat is present within the Facility Site. Observed during 2008 on-site surveys. | TES | Yes |
| Wood Thrush *Hylocichla mustelina* | N/A | SGCN | Found in shady, deciduous and mixed forests. Suitable habitat is present within the Facility Site. Two observations during 2015 breeding bird surveys. | TES NEES NHP | Yes |
| Scarlet Tanager *Piranga olivacea* | N/A | SGCN | Found in deciduous and mixed forests. Suitable habitat is present within the Facility Site. Incidentally observed during 2015 breeding bird surveys. | TES OB | Yes |
| Cattle Egret *Bubulcus ibis* | Protected | SGCN | Habitat includes farms, marshes, pastures, wet fields. Suitable habitat is present within the Facility Site. Not observed on-site. | NHP | No |
| Least Bittern *Ixobrychus exilis* | N/A | SGCN | Habitat includes fresh marshes and reedy ponds. Suitable habitat is present within the Facility Site. Not observed on-site. | FWS | No |
| Northern Pintail *Anas acuta* | N/A | SGCN | Found in marshes, prairies, fresh ponds, and lakes. Suitable habitat is present within the Facility Site. Observed during 2008 on-site surveys. | TES | Yes |
| Lesser Scaup *Aythya affinis* | N/A | SGCN | Found in lakes, bays, estuaries, and marsh ponds in the summer. Suitable habitat is present within the Facility Site and Lake Ontario. Observed during 2015 on-site surveys | TES | Yes |
| Ruddy Turnstone *Arenaria interpres* | N/A | SGCN | Habitat includes beaches, mudflats, rocky shorelines. Suitable habitat is present within the Facility Site. Observed during the 2008 on-site surveys and as an early spring migrant during the 2015 breeding bird studies. | TES OB | Yes |
| American woodcock *Scolopax minor* | N/A | SGCN | Habitat includes wet thickets, moist woods, and brushy swamps. Suitable habitat is present within the Facility Site. Observed during on-site surveys. | TES OB EDR | Yes |
| Caspian Tern *Hydroprogne caspia* | Protected | SGCN | Habitat includes large lakes, coastal waters, beaches, and bays. Lake Ontario provides suitable habitat. Observed during 2008 on-site surveys. | TES NHP | Yes |
| Black-billed Cuckoo *Coccyzus erythropthalmus* | N/A | SGCN | Inhabits wood edges, groves, and thickets. Suitable habitat is present within the Facility Site. Observed during 2008 on-site surveys. | TES FWS | Yes |

| Species | NYS Status | SGCN Status[1] | Ecology | Source[2] | Observed on-site? |
|---|---|---|---|---|---|
| Wood Thrush *Hylocichla mustelina* | N/A | SGCN | Mainly inhabits deciduous woodlands. Breeds in understory of tall mostly deciduous but sometimes mixed woodlands. Suitable habitat present within the Facility Site. Observed during on-site surveys. | TES OB FWS | Yes |
| Black-throated Blue Warbler *Setophaga caerulescens* | N/A | SGCN | Habitat includes interior of hardwoods and mixed deciduous-coniferous forests. Breeds in large areas of relatively undisturbed maple-hemlock forest. Observed during 2008 on-site surveys | TES | Yes |
| Tennessee Warbler *Vermivora peregrina* | N/A | SGCN | Found as a migratory species within the region. Habitats includes deciduous and mixed forests. Suitable habitat is present within the Facility Site. Observed during 2008 on-site surveys. | TES | Yes |
| Silver-Haired Bat *Lasionycteris noctivagans* | N/A | SGCN | A migratory bat that resides in deciduous and mixed forests, often near water. Roost in bark crevices and hollows. Suitable habitat present within the Facility Site. At least 4% of bats calls identified during on-site bat survey. | NEES | Yes |
| Eastern Red Bat *Lasiurus borealis* | N/A | SGCN | A migratory bat that often resides in forested areas; does not overwinter in caves. Suitable habitat present within the Facility Site. At least 51% of bats calls identified during on-site bat survey. | NEES | Yes |
| Hoary bat *Lasiurus cinereus* | N/A | SGCN | Prefers forested habitats and roosts on trees, hidden by foliage. Suitable habitat is present within the Facility Site. At least 5% of bats calls identified during on-site surveys. | NEES | Yes |
| Northern Map Turtle Graptemys geographica | N/A | SGCN | Found in rivers and lakeshores, preferring slow moving waters with soft bottoms. Suitable habitat is present within the Facility Site in Gill Harbor. One individual was found during 2008 turtle trapping survey. | TES | Yes |
| Longnose Sucker *Catostomus catostomus* | N/A | SGCN | This species prefers cold, clear waters, living on the bottom of streams and lakes down to depths of 180 meters in the Great Lakes. Suitable habitat is present in Lake Ontario. Not observed on-site. | FA | No |
| Bridle Shiner *Notropis bifrenatus* | N/A | SGCN | Habitat includes near shore areas of lakes and streams with sufficient submerged aquatic vegetation. Suitable habitat occurs in Gill Harbor and the North Pond. Not observed on-site. | FA | No |
| Blackchin Shiner *Notropis heterodon* | N/A | SGCN | Habitat includes near shore areas of lakes and streams with sufficient submerged aquatic vegetation. Suitable habitat occurs in Gill Harbor and the North Pond. Not observed on-site. | FA | No |
| Blacknose Shiner *Notropis heterolepis* | N/A | SGCN | Habitat includes near shore areas of lakes and streams with sufficient submerged aquatic vegetation. Suitable habitat occurs in Gill Harbor and the North Pond. Not observed on-site. | FA | No |
| Lake Trout *Salvelinus namaycush* | N/A | SGCN | Can be found in all Great Lakes, prefer deep waters with temperatures between 40-55 degrees Fahrenheit. Recorded near Galloo Island pre-1977. No suitable habitat found within Facility Site. Not observed on-site. | FA | No |

[1] SGCN Status refers to the species' status under the Comprehensive State Wildlife Strategy. SGCN = Species of Greatest Conservation Need, SGCN-HP = Species of Greatest Conservation Need – High Priority.

[2] Source: TES = observed on-site by TES, Inc. biologists, NHP = New York Natural Heritage Program site-specific request for data, FWS = US Fish & Wildlife Service IPaC consultation, NEES = observed by North East Ecological Services' biologists, OB = observed by Old Bird Inc. biologists, BBA = NYS Breeding Bird Atlas, FA = NYS Fish Atlas, EDR = observed by EDR biologists.

[3] Also federally-listed as endangered.

[4] Also federally-listed as threatened.

*Impacts to Special Status Plants and Significant Ecological Communities*

No threatened, endangered, candidate, or rare plant species, nor significant ecological communities were identified by either the USFWS IPaC results or the NYNHP response letter, nor were any observed on-site during ecological surveys. Therefore, Facility construction and operation is not expected to result in adverse impacts to protected plants or to significant ecological communities.

*Impacts to Special Status Birds*

Impacts Based on Results of On-Site Avian Surveys

One federally (Bald and Golden Eagle Protection Act) and State-listed threatened species (bald eagle); one State-listed endangered species (short-eared owl); and two State-listed threatened species (northern harrier and upland sandpiper) were found within the Facility Site. Eight birds identified as special concern or listed as protected within New York State (great blue heron, Caspian tern, red-headed woodpecker, common loon, American bittern, cerulean warbler, Cooper's hawk, and sharp-shinned hawk) were identified at Galloo Island.

There are no known eagle nests within the Facility Site, and the closest documented eagle nest is more than 14-18 miles away to the east around Black River Bay and north on Carleton Island (B. Denoncour, NYSDEC, pers. comm., April 13, 2017).

There were four special status bird species that were identified by NYNHP as occurring within 10 miles of the Facility Site, but were not documented during on-site surveys: cattle egret, black tern (*Chlidonias niger*) (SE), sedge wren, and common tern. Impacts to these species are generally not anticipated, because they either do not use the Facility Site at all, or they use the Facility Site so infrequently as to not be detected during on-site surveys designed in consultation with the NYSDEC and USFWS.

Four State-listed species of birds are included in the Galloo Island Wind Conservation Plan: upland sandpiper, northern harrier, short-eared owl, and bald eagle. The upland sandpiper is listed as "breeding" on Galloo Island by NYNHP, and the northern harrier may also occasionally breed on the island. A short-eared owl was observed by a field biologist while on the island. Even though there are currently no known nesting bald eagles on or within 10 miles from the island, the species has been observed on the island at levels that may subject it to risk (WEST, 2017).

Facility construction impacts would occur primarily during forest clearing required for access roads and turbine pads. Forest clearing is to be conducted between October 1 and May 31, which is outside of the nesting period for other raptor species, minimizing or avoiding potential direct impacts to threatened and endangered bird species.

Further, the lack of documented breeding populations of these species within the Facility Site indicates a low potential for impacts. Potential habitat-related impacts such as fragmentation effects are discussed in Section (f)(3) above.

Impacts Based on Results of Habitat Assessment

The ITP Application assessed the potential for suitable habitat for bald eagles, northern harriers, short-eared owls, and upland sandpiper to occur on Galloo Island. The results are described below and can be found in more detail in the conservation plan (Appendix DD). The large wooded freshwater wetland located centrally on Galloo Island is typical of where great blue heron establish rookeries (NYSDEC, 2016c). However, throughout numerous site visits by biologists, general ecologists, and avian experts, no great blue heron nests were observed. The lack of documented breeding populations of these species within the Facility indicates a low potential for impacts. These species are not expected to occur more than just occasionally in the Facility Site, due to lack of suitable habitat.

*Bald eagles*

Bald eagles prefer habitats with conifer trees near open water and were observed flying over Galloo Island during ecological resource surveys in 2007 and 2008 (TES, 2009). While there are no records of bald eagle nests on or near Galloo Island, the 493 acres of forest habitat on the island can be considered potentially suitable habitat for bald eagle roosting. In addition to the forest habitat, approximately 107 acres of marsh habitat on the island could potentially be a suitable area for bald eagle foraging. Of the 665 acres of suitable habitat (including open water) for bald eagles, only 35 acres would be temporarily disturbed during construction and 4.9 acres would be permanently lost. This small amount of permanent habitat loss is anticipated to have minimal effect on habitat or bald eagle use of the potential habitat on the island.

The shoreline of Galloo Island would provide the most suitable habitat for bald eagles since it provides perching opportunities around foraging habitat in the lake. Inland forested areas on the island may provide winter roosting habitat; however, this is not supported by observations or historical records. Turbines would be set back at least 250 feet from the shoreline, which would reduce the number of bald eagles using the shoreline for perching or foraging that would encounter the turbines. Bald eagles exposed to the turbines would be limited to those flying in the inland areas to nest or forage. Although no current or historical bald eagle nests have been documented on the island, the eagle population is expanding and the species may begin nesting on the island at some point in the future if it is not deterred or displaced by the operation of the Facility. The Facility is thus not expected to impact nesting eagles. Based on observations of bald eagles around Galloo Island, it appears that the island provides year-round foraging habitat for non-territorial sub-

adults, floaters, and/or wintering individuals. These few non-breeding individuals may be impacted by the construction and operation of the turbines.

At the wind farm on Wolfe Island, approximately 12 miles north of Galloo Island, there was essentially no difference between eagle counts at the wind farm compared to the nearby Christmas Bird Count for two years after wind farm construction (Stantec, 2011). In addition, over the eight years of operation of the Wolfe Island windfarm, where bald eagle activity is known to occur, no eagle fatalities have been recorded, suggesting risk to bald eagles at Galloo Island is also low.

*Northern Harrier*

Northern harriers were observed on Galloo Island in open and agricultural fields and scrub-shrub and emergent wetland habitats (TES, 2009). The population of northern harriers is often largely dependent upon prey populations. Male harriers have been documented foraging more than 6 miles from nest sites and covering over 93 miles a day (NYSDEC, 2016a). On Galloo Island, there is approximately 818 acres of grassland habitat and 107 acres of marsh habitat that is potentially suitable for northern harrier nesting and foraging. Of the approximately 925 acres of suitable grassland and marsh habitat on the island, approximately 68.9 acres would be temporarily disturbed and 31 acres would be permanently lost. Based on field visits, it was determined that 70% of the available habitat is infested by the invasive pale swallow-wort. These areas of pale swallow-wort are likely not suitable for northern harrier foraging or breeding.

In 2009 field studies, juvenile northern harriers were observed hunting in close association with an adult female harrier indicating that the young had been fledged on the island (Old Bird Inc., 2016). Observations of northern harriers on the island suggest that the island could support a breeding pair, while winter numbers may fluctuate depending on prey populations. However, no northern harriers were observed during the 2015 surveys (Old Bird Inc., 2016).

The wind farm on the nearby Wolfe Island (12 miles from the proposed Facility) has high quality grassland habitat with a high abundance and diversity of grassland birds. During a multi-year study at this wind farm, it was reported that fluctuations in northern harrier populations closely mirrored prey populations, indicating that northern harrier populations are driven more by prey populations and are likely not a result of avoidance of the turbines. Harriers have also been observed foraging within the Maple Ridge Wind Project in Lewis County, New York, 65 miles east of Galloo Island (Jain et al., 2007, 2008).

Based on results of 67 monitoring studies of wind farms located within the range of northern harriers, collision risk is generally low for the species. Only 20 fatalities were documented nationwide, and only three of those 20 were in the Northeast. The three fatalities observed in the Northeast coincide with the breeding season. During courtship, the northern harrier may fly within the rotor swept area, but otherwise they hunt, eat, and perch low to the ground (MacWhirter and Bildstein,1996 and Smith et al., 2011). This behavior likely decreases the potential for this species to collide with wind turbines except perhaps during breeding season. Based on collected data, Galloo Island is not likely to have more than one nesting pair of northern harriers and regular diurnal transit of northern harriers between the island and the mainland appears to occur with very low frequency (Old Bird Inc., 2016). The risk of turbine related fatalities would be lower at Galloo Island than at projects like the wind farm on Wolfe Island due to the lower breeding density, fewer turbines, and small size of the Facility area.

*Short-eared owl*

Short-eared owls are typically found in marshes, grasslands, and tundra. The owls are ground-nesting species during breeding season, and may roost in trees during the winter, especially when snowy conditions are present (Wiggins et al., 2006). Short-eared owl populations likely fluctuate with prey populations. Field biologists observed one short-eared owl on site during vegetative surveys in 2007 and 2008 and it was determined that the island has potentially suitable habitat for at least a pair of the species (Old Bird Inc., 2016). However, during bird surveys in the 2008 breeding season when prey species were abundant on the island, no short-eared owls were reported. Therefore, biologists concluded that the island has low site-fidelity for the species and nesting is likely uncommon.

Although this species is not expected to nest on the island, based on field studies, there would be 818 acres of grassland vegetation and 107 acres of marsh habitat that would be considered potentially suitable for short-eared owl foraging. Of this habitat, approximately 69 acres would be disturbed during construction and 31 acres would be permanently lost. However, as mentioned above, the majority of the grasslands are infested with pale swallow-wort, which would likely be unsuitable for short-eared owl roosting, foraging, and breeding.

Similarly to northern harriers, the species has a low-altitude foraging behavior and would only be at a collision risk during migration or during aerial courtship flight displays. No short-eared owl turbine-related fatalities have been reported in the northeastern U.S. or in Canada, including at the wind farm on Wolfe Island, which is known to have high use by the species (Stantec Ltd., 2014). Given the absence of the species on the island, the risk of collision-related fatalities, if any, would occur during migration periods.

*Upland sandpiper*

The upland sandpiper is a fully terrestrial shorebird that typically nests on the ground in dry grasslands (NYSDEC, 2016a). The species is sensitive to habitat fragmentation and typically require approximately 250 acres to nest, with up to four breeding pairs per 250 acre plot (Ribic et al., 2009 and Vickery et al., 2010). Approximately 818 acres of grassland habitat on Galloo Island could potentially be suitable for upland sandpiper nesting and foraging. Of that area, 67 acres would be temporarily disturbed during construction, and 12.5 would be permanently lost due to conversion to Facility components. As mentioned above, the infestation of the pale swallow-wort over much of these grasslands would likely make the area unsuitable for upland sandpiper.

Low numbers of upland sandpipers were recording on Galloo Island during avian surveys and there was no evidence of fledged young in any of the surveys, including targeted breeding bird surveys in the grasslands on the southern portion of Galloo Island (WEST, 2017). The studies indicated that very low numbers of upland sandpiper are present on the island during the breeding season (i.e., one to three adults), and that the island is not typically used for successful breeding.

The displacement of grassland birds by construction and operation of wind turbines has been demonstrated, but not specifically with respect to the upland sandpiper (Pearce-Higgins et al., 2009, 2012). Changes in upland sandpiper nesting due to wind facilities have ranged from no change to changes extending beyond 984 feet of turbines (Schaffer and Buhl, 2015) suggesting that displacement may vary by wind facilities based on variables yet to be understood (WEST, 2017). Upland sandpipers could be at risk of collision if a breeding territory or display ground exists near a turbine (Illinois Department of Natural Resources, 2007). The wind farm on Wolfe Island was found to not compromise upland sandpiper breeding sites; however, three upland sandpiper fatalities were recorded at that wind farm during a 36-month monitoring period.

To reduce the risk of upland sandpiper collisions with turbines, no wind turbines will border the western or southern reaches of the grassland habitat where upland sandpipers were documented during field studies. Due to the relatively low abundance of the species observed on the island, the risk of collision to upland sandpiper during migration is not expected to be substantial. In addition, the Applicant has proposed to restrict construction within 650 feet of nesting areas during breeding season.

Impacts to Species of Greatest Conservation Need

Seventeen avian species with SGCN status (bald eagle, northern harrier, American bittern, cerulean warbler, common loon, American kestrel, wood thrush, scarlet tanager, northern pintail, lesser scaup, ruddy turnstone,

American woodcock, Caspian tern, black-billed cuckoo, wood thrush, black-throated blue warbler, and Tennessee warbler) were observed during on-site surveys (see Table 22-5). Eleven avian species with SGCN-HP status were observed during on-site surveys, including short-eared owl, upland sandpiper, red-headed woodpecker, grasshopper sparrow, brown thrasher, bobolink, eastern meadowlark, American black duck, semipalmated sandpiper, bay-breasted warbler, and Canada warbler (see Table 22-5). Generally, avian impacts at wind projects are low. Given the low numbers of SGCN documented during baseline studies and anticipated to occur during operations, and the low risk profile due to the behavior and habitat associations of most of these species, impacts are not expected to be significant or adversely affect viability of local area populations.

Additionally, four avian species with SGCN status (common tern, cattle egret, pied-billed grebe [*Podilymbus podiceps*] (ST), and least bittern) and four avian species with SGCN-HP status (sedge wren, golden-winged warbler, black tern, and olive-sided flycatcher) are identified by NYNHP and/or the USFWS as known from, or nearby the Facility Site. Since these species were not identified on site during any of the numerous ecological studies, it is unlikely that these species utilize the Facility Site at a level where construction or operation will have a negative effect on their populations.

Impacts to Species of Special Concern

From the sources listed at the beginning of this section, nine species of special concern have been listed. Seven of these species are also listed as either SGCN or SGCN-HP and discussed in the corresponding section above. The remaining two species, Cooper's hawk and sharp-shinned hawk, were observed on-site during ecological surveys (see Table 22-5). These species are relatively common and widespread, and while susceptible to low levels of collision impact, are not likely to be adversely affected at the local or regional population scale.

Impacts to Special Status Mammals

The Facility Site is within the known range of the State- and federally-listed endangered Indiana bat and State- and federally-listed threatened northern long-eared bat, and New York State species of special concern eastern small-footed myotis. The NYNHP also identified eastern small-footed myotis as located within 40 miles of the Facility Site. These species hibernate during winter and can be found in forested areas throughout the Northeast during spring, summer, and fall.

In 2008, NEES conducted a pre-construction bat risk assessment for the Facility and in 2009 and 2015, extensive acoustic and mist netting surveys were completed. (NEES, 2009 and 2016). Despite extensive sampling within these habitats during these surveys, no direct evidence of the Indiana or northern long-eared bats was detected during acoustic and mist net surveys. Calls of little brown myotis were recorded (NEES, 2016). Nonetheless, as a

conservative measure, the Applicant has included northern long-eared bat in the Conservation Plan for the Facility (WEST, 2017) based on the assumption of the NYSDEC that the entire state of New York is considered occupied by these species during the fall migration period.

Potential direct mortality of listed bats during construction will be avoided through conducting forest clearing between October 1 and May 31, outside of the spring and summer reproductive period. As a result of this measure, forest clearing associated with the Facility is not expected to result in significant habitat-related impacts to the northern long-eared bat. Potential effects of habitat fragmentation on bats are addressed in Section (f)(3).

The calls of silver-haired bats, red bats, and hoary bats—all species with SGCN status—were positively identified during on-site acoustic surveys. Additionally, little brown myotis, a species with SGCN-HP status, was positively identified during on-site acoustic surveys. Direct mortality through Facility construction will be limited, however, because tree clearing will take place between October 1 and May 31, outside of the breeding and activity periods for these species (see section (f)(2) for a discussion of construction-related impacts to bats) and feathering blades to wind speeds of 5 m/s during July, August and September and to manufacturer's cut in speed (3m/s) during April, May, June and October, which will significantly reduce impacts to these species). In addition, feathering to wind speeds of 5 m/s during July, August and September and to manufacturer's cut in speed (3 m/s) during April, May, June and October, will significantly reduce impacts to these species. The Applicant has developed these and other avoidance, minimization, and mitigation measures to minimize risks and mitigate impacts to these species (see Section (h)(3) below for a discussion of the avian and bat impact avoidance and mitigation plan). These species are not listed as threatened or endangered or special concern, and have population numbers statewide that are more stable than species listed under one of these protection statuses. Therefore, it is not anticipated that Facility construction or operation will have a significant effect on statewide or range wide populations.

*Northern long-eared bat*

While no northern long-eared bats were identified on the island during acoustic and mist netting surveys, there are 493 acres of forest habitat on Galloo Island. Approximately 31 acres of forested habitat would be temporarily disturbed by construction and 12.1 acres would be permanently lost due to the proposed Facility components. As there are no hibernacula or maternity roosts on the island, no impact to reproduction or winter survival would be anticipated. The forest habitat is not limiting to the species and the loss of 12.5 acres is considered insignificant and discountable.

Turbine-related mortality of northern long-eared bats has been documented at low levels at wind projects in the Northeast, with 43 mortalities (less than 1% of bat mortality) documented at 19 facilities (USFWS, 2016).

The USFWS has concluded that, despite some monitoring limitations, northern long-eared bats were rarely detected as mortalities, even when they were known to be common on the landscape around wind energy facilities (USFWS, 2016). Extensive post-construction monitoring dataset collected at wind facilities across Pennsylvania from 2007 to 2011 indicated that collision mortality is relatively rare for northern long-eared bats, even though the species has historically been widespread and relatively common in Pennsylvania. Many of the wind energy facilities in Pennsylvania were developed in forested land and are likely to have or had summer resident northern long-eared bats on site or nearby. However, of 4,245 total bat carcasses found during monitoring between 2007 and 2011 at wind projects in the Pennsylvania, only two northern-long eared bats were found (Taucher et al., 2012). In New York, the last northern long-eared bat fatality recorded from a wind project was in 2011, during the white-nose syndrome transitional years (when the disease was causing declines). There have been no recorded fatalities from wind projects during the post-white nose syndrome era when the population is most depressed (WEST, 2017). Collision risk at Galloo Island for northern long-eared bats would be limited to the fall migration as probable absence was confirmed during summer (NEES, 2009 and 2016) and there are no known spring fatalities. The closest known summer maternity site is approximately 26 miles away from the proposed Facility, and the closest known hibernaculum is approximately 17 miles from the proposed Facility (WEST, 2017). Therefore, the number of northern long-eared bats migrating over the island is expected to be very low, if any, and the likelihood of collision mortality is considered very low.

The USFWS has concluded that the level of observed northern long-eared bat mortality at wind farms does not constitute a significant risk to the species, particularly in light of voluntary industry BMPs establishing the operating protocol of feathering turbines below normal cut-in speed (USFWS, 2016). As discussed in the conservation plan developed for the Project, cut-in speed curtailment of 5 m/s from July 1 to September 30 and 3 m/s for April, May, June, and October will be implemented at the Facility, which reduces risk to northern long-eared bats to very low levels.

Impacts to Special Status Fish

One fish species listed as State-threatened, the Lake sturgeon (*Acipenser fluvescens*) (ST), was identified by the NYSDEC Fish Atlas as located in Lake Ontario near the Facility Site. Five other fish species were identified with the status of SGCN—longnose sucker (*Catostomus catostomus*), bridle shiner (*Notropis bifrenatus*), blackchin shiner (*Notropis heterodon*), blacknose shiner (*Notropis heterolepis*), and lake trout—and one species—the threespine stickleback (*Gasterosteus aculeatus*)—was identified as SGCN-HP. These fish are known to occur in Lake Ontario, which surrounds the Facility Site.

Impacts to any of the special status fish species discussed above are not anticipated as a result of Facility construction or operation. Other than a small temporary barge installation for equipment and supply deliveries to Galloo Island and a small dock for the O&M facility, the entire Facility Site is located outside of the boundaries of Lake Ontario.

Impacts to Special Status Amphibians and Reptiles

One reptile species (northern map turtle) was document during the 2008 turtle trapping survey (TES, 2009). The northern map turtle is listed as SGCN. This species is an aquatic turtle which only leaves the water to bask or nest and is quick to seek underwater refuge when disturbed. Northern map turtles nest in unshaded sandy or otherwise soft soils (Gibbs *et. al.* 2007).

Impacts to northern map turtle are not anticipated as a result of Facility construction or operation. Other than a small temporary barge installation for equipment and supply deliveries to Galloo Island and a small dock for the O&M facility, the entire Facility Site is located outside of the boundaries of Lake Ontario. Therefore, impacts to this species habitat will be minimal to none.

Impacts to Special Status Invertebrates

No special status invertebrates were identified in agency correspondence as likely to occur on or nearby the Facility Site. Likewise, no special status invertebrates were observed during any of the numerous ecological surveys performed in the Facility Site. Therefore, it is not anticipated that Facility construction or operation will have any negative impacts on invertebrate populations.

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

With respect to measures to avoid or mitigate impacts to plant communities (including vegetation), see Section 22(c) above.

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

To avoid and minimize impacts to aquatic resources resulting from construction-related siltation and sedimentation, an approved sediment and erosion control plan and SWPPP will be implemented. The sediment and erosion control plan and Preliminary SWPPP are described in Exhibit 23(c)(1) and a copy of the Preliminary SWPPP is included as Appendix GG. Proper implementation of these plans will assure compliance with NYSDEC State Pollutant Discharge Elimination System (SPDES) regulations and New York State water quality standards. In addition, a Preliminary Spill Prevention, Control, and Countermeasures (SPCC) Plan has been developed and will be implemented to minimize the potential for unintended releases of petroleum and other hazardous chemicals during Facility construction and operation (see Exhibit 23 for additional information).

Mitigation for impacts related to permanent habitat loss and forest fragmentation will be accomplished through careful site design. Facility access roads and collection lines have been sited along existing island roads and the edge of forests in order to minimize impacts to, and fragmentation of, forest habitat types.

Operational bird and bat protection measures will also reduce avian and bat collision mortality. The American Wind Energy Association recently published a voluntary operational BMP that could reduce bat impact mortality by up to 30% (AWEA, 2015). The Applicant plans to implement this BMP, which consists of reducing blade rotation speed when wind speed is low during the bat fall migration period at certain temperature thresholds, thereby reducing collision risk. In addition, the number of stormwater control features (such as sediment retention ponds) will be minimized to reduce on-site attractants to bats. A more detailed description of the Avian and Bat Impact Avoidance and Mitigation plan for each phase of construction is provided in section (h)(3) below.

The Applicant plans to conduct post-construction monitoring for avian and bat mortality. See Section (h)(2) below for details regarding these plans.

(h) For Proposed Wind-Powered Facilities

(1) Avian and Bat Impacts

The Avian Risk Assessment (Appendix EE) evaluated the potential effects of Galloo Island in combination with the effects of proposed and existing projects in the region with similar ecosystem types. Currently, there is one wind project, the Wolfe Island Wind Project in Ontario, Canada, in a similar ecosystem as the Facility, specifically islands and shoreline projects in the eastern Ontario Lake Plain and St. Lawrence plain areas. Assuming that impacts to avian resources at Galloo Island would be similar to the average documented at the Wolfe Island Wind Project (4.48 birds/MW/year), 487 bird fatalities per year could be expected; or based on the average mortality rate from

16 post-construction monitoring studies of 10 wind facilities in New York of 1.68 birds/MW/year, approximately 183 bird fatalities per year could be expected from the Facility. Given that this would be spread across many species, no particular species would likely be affected in a significant way by the Facility itself. The low level of level of species-specific mortality, coupled with the existing mortality estimated at 886 bird fatalities per year for the Wolfe Island Wind Project, is not likely to result in significant cumulative impacts to any given species due to the fractional percent of birds affected overall.

According to the NYSDEC, there are two other wind projects proposed for the region that would be located in similar ecosystems, Horse Creek Wind Project in Jefferson County, New York and Amherst Island Wind Project, Canada. Under the assumptions that the projects will have a combined 100 MW, will be operational during the life of the Galloo Island Facility, and will exhibit similar avian mortality rate to that seen within New York (1.68 birds/MW/year), then an additional 168 bird fatalities per year per facility could be expected in addition to those from Galloo Island and Wolfe Island. Because these impacts would be distributed across a range of species, the cumulative effect on any give avian population is likely insignificant to population viability or stability.

As previously mentioned numerous pre-construction avian and bat studies have been conducted, which were based on the May 2015 Work Plan for Pre-Construction Avian and Bat Surveys. Copies of all reports prepared in accordance with this work plan have been provided to NYSDEC and DPS personnel, and these reports are outlined in Table 22-3. Full detail on methodology and results of these studies is provided in section (d). A comprehensive analysis of construction and operation-related impacts to birds and bats, as well as their habitats, as a result of the Facility is provided in section (f). With the determination that the take of State-listed species is likely to occur, the Applicant has also compiled an impact avoidance and mitigation plan included in the ITP. A detailed description of impact avoidance and mitigation to these listed species related to Facility construction and operation is provided in section (h)(3) below.

(2) Avian and Bat Post-Construction Monitoring

A post construction monitoring study will be completed during the first two years of Facility operations to evaluate the effectiveness of the avoidance measures and determine if changes to operational protocols are appropriate or necessary to reduce the impact of the Facility. The monitoring plan will be designed to be consistent with the objectives of the standard post-construction studies of the NYSDEC Guidelines (see NYSDEC, 2016b) and with Tier 4 studies of the *Land Based Wind Energy Guidelines* (USFWS, 2012). Exact details of the post-construction monitoring program will be determined on a site-specific basis through discussions between NYSDEC, USFWS, and the Applicant, and be in place prior to the start of project operation. During the fatality searches, if a mortality

of any New York State-listed species is identified, the NYSDEC will be notified within 24 hours of discovery, or as soon as possible thereafter if logistical constraints prevent immediate notification.

(3) Avian and Bat Impact Avoidance and Mitigation Plan

The Conservation Plan quantifies the potential impacts on the following species: northern long-eared bat, bald eagle, northern harrier, upland sandpiper, and short-eared owl. The measures discussed below will be employed for each phase of construction and operation to avoid, minimize and mitigate adverse impacts and provide a net conservation benefit for all these listed species, as well as reduce risk and mitigate impacts to non-listed species that utilize their habitats.

*Impact Avoidance*

Project Planning and Design Phase

Preconstruction site monitoring, testing activities, and installations will be minimized to prevent disturbance to birds within the Facility Site to the maximum extent practicable. Turbine sites have been located at least 76 meters (250 feet) from the island shoreline to minimize risk to eagles perching or hunting over the lake. Additionally, turbine sites avoid inland waterbodies and wetlands when possible, particularly waterbodies with occupied bird habitat. Planned tree removal has been minimized by taking advantage of existing access roads and clearings. Mature trees will be avoided when possible and tree removal will not occur during the months of June through September to avoid potential roosting sites and reduce habitat loss. All collection lines between turbines will be buried or co-located with existing roads to the maximum extent possible to minimize disturbance. Guy wires will be marked or eliminated to minimize collision risk. Turbines will be separated by a minimum of 381 meters (1,250 feet) to minimize turbulence effects and provided clear passage for birds traveling in the area.

Construction Phase

Vegetation clearing for installation of facilities will be conducted between October 1 and May 31. Ponding water will be minimized after construction to avoid attractants to birds and bats. Disturbed areas will be restored to their native or original contours and revegetated to minimize habitat conversion or spread of non-native vegetation. Fire prevention BMPs will be implemented during construction to avoid wildfires and habitat loss. Trash and food waste will be placed in closed containers and regularly removed to reduce the attractiveness of the site to avian scavengers and their prey. Vehicular speed will be limited to 40 Kilometers per hour (25 miles per hour) on site roads to reduce risk of collisions with wildlife and roadkill carcasses that may attract avian scavengers. If any active nests of threatened or endangered bird species are discovered within an active construction, ground clearing, or grading site, the regional NYSDEC Natural Resources Supervisor will be notified and the nest site will be marked.

For upland sandpiper, short-eared owl, and northern harrier nests, an area of at least 100 feet in diameter around the nest will be avoided until notice to continue construction at that site has been granted by the NYSDEC Natural Resources Supervisor. For a bald eagle nest, an area of at least 1,500 feet in diameter around the tree with the nest will be avoided, and the nest tree will not be approached under any circumstances unless authorized by the regional NYSDEC Natural Resources Supervisor. Construction staff will be trained to detect and avoid covered species and their potential nesting areas.

Operations Phase

Any hunting will be done with non-lead ammunition, as lead is a detriment to scavenging raptors, including eagles. Carcasses and gut piles resulting from hunting will be removed or buried so as to be unavailable to scavenging raptors. Lights used to illuminate facilities will be downward projecting and motion activated as practicable, to minimize attractants to nocturnal migrating birds and bats. Trash and food waste will be placed in closed containers to reduce the attractiveness of the site to avian scavengers and their prey. Vehicular speed will be limited to 25 miles per hour on site roads to reduce risk of collisions with wildlife and roadkill carcasses that may attract avian scavengers. O&M staff will be trained to be aware of potential impacts and hazardous conditions for wildlife. Turbine blades will be feathered to wind speeds below 3.0 m/s (9.8 feet per second) in temperatures above 10 degrees Celsius (50 degrees Fahrenheit), from sunset to sunrise during April, May, June and October, and at wind speeds below 5.0 m/s and temps above 10 degrees C during July, August and September to reduce impacts to bats. Stormwater control features, such as retention basins, may encourage the presence of foraging bats and will be minimized.

*Mitigation Measures*

Remaining minor impacts related to pre- and post-construction phases will be mitigated through conservation measures related to ensuring the net conservation benefit for the covered species. As previously noted, mitigation measures specific to bald eagles includes requiring non-lead ammunition for any hunting that may occur on the Facility Site during operations. Lead exposure from spent ammunition can lead to raptor mortality and likely is a persistent impact on the current eagle population using the island. Exposure to this contaminant from unrecovered hunted carcasses will be eliminated, resulting in a direct benefit to the eagle population using the island. Mitigation measures for other covered species include contributing to the conservation of these species by protecting or enhancing suitable habitat for these species over the term of the ITP as discussed in the Conservation Plan (Appendix DD)

(i) Map Showing Delineated Wetland Boundaries

Wetland and stream delineations were conducted in 2008 in support of permitting for the Hounsfield Wind Farm (C&S and TES, 2008). These delineations were updated in 2016 and 2017 to address the revised project boundary, to account for potential changes in the project layout and to update the delineation as the prior study was completed more than five years earlier. Results of the new delineation supersede those from 2008. Wetland delineations within the Facility Site were conducted within a 200-foot wide corridor centered on linear Facility components (e.g., access roads, buried electrical interconnect), and within a 200-foot radius of turbines and other components such as permanent meteorological towers, operations and maintenance (O&M) building, substation, and laydown areas. This area in which delineations took place is referred to as the Delineation Study Area throughout this Exhibit. Wetland delineations were conducted by EDR personnel during the summer of 2016 and 2017, in accordance with the three-parameter methodology described in the U.S. Army Corps of Engineers (USACE) *Wetland Delineation Manual* (Environmental Laboratory, 1987), and further described by the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: North Central and Northeastern Region* (USACE, 2012). Wetland boundaries were defined in the field by sequentially numbered pink surveyor's flagging marked "wetland delineation," the locations of which were documented using Global Positioning System (GPS) technology with sub-meter accuracy. Wetlands identified by these methods are referred to as delineated wetlands throughout this Exhibit.

In order to define boundaries out to 500 feet from Facility components, EDR personnel used interpretation of aerial imagery signatures, on-site observations, analysis of topography, and the results of previous on-site wetland studies. Wetlands identified in this way are referred to as approximate wetlands throughout this Exhibit. Any of the approximate wetlands (i.e., those identified during 2008 delineations or interpreted from aerial images) located outside of the 200-foot delineation study corridor are included on the wetlands maps and are identified with a different line-type to differentiate between "delineated" and "approximate". All delineated and approximate wetlands described here are depicted in Figure 22-3 and in greater detail in Figure 7 of the Wetland Delineation Report.

On October 5, 2016, an on-site preliminary jurisdictional determination was conducted with USACE and NYSDEC personnel and there was general agreement regarding the approach to defining wetlands as stated above. Consultation with these agencies will continue through the filing of a wetland permit application with the USACE in the fall of 2017.

(j) Description of Wetlands

Descriptions of each wetland community type delineated within the Delineation Study Area, including the Cowardin classification, are presented below. At each delineated wetland, data were collected from one or more sample plots (depending on the size and diversity of ecological communities of the delineated area), and recorded on USACE routine

Wetland Determination Data Forms (Attachment B of the Wetland Delineation Report, included as Appendix FF of this Application). Data collected at each of the wetlands included dominant vegetation, hydrology indicators, and soil characteristics. Additional detail on wetland delineation and data collection methods is described in the Wetland Delineation Report. Also included in the Wetland Delineation Report is a table of all of the wetlands delineated within the Delineation Study Area, which indicates wetland acreage within the Delineation Study Area, wetland community type, and whether they are expected to fall under State or federal jurisdiction (or both).

*Forested Wetlands (PFO)*

A total of eight wetland features delineated within the Delineation Study Area contained forested wetland communities (see Table 22-7). These communities are dominated by trees that are 20 feet or taller, but also include an understory of shrubs and herbaceous species. The presence of tall, mature or old growth trees were not identified within these wetlands. This is likely due to shallow bedrock and a limited soil matrix that results in stunted tree growth. They were primarily dominated by green ash, with occasional American elm. Herbaceous species in forested wetlands included smallspike false nettle, sedges (*Carex lacustris, Carex vulpinoidea, Carex scoparia*, and *Carex spp*.), swamp milkweed (*Asclepias incarnata*), rough and creeping bentgrass (*Agrostis scabra),* and reed canary grass. Evidence of wetland hydrology in the forested wetlands included algal mat or crusts, oxidized rhizospheres on living roots, geomorphic position, water marks, drainage patterns, sparsely vegetated concave surfaces, and microtopographic relief. Hydric soils observed in forested wetlands were predominantly redox dark surface (indicator F6). As described in the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: North Central and Northeastern Region*, a redox dark surface is a soil that is at least 4 inches thick, starting at a depth of at least 8 inches from the soil surface (USACE, 2012). These soils generally had a matrix value of 3 or less and chroma of 2 or less and 5 percent or more distinct or prominent redox concentrations. The majority of soils sampled within forested wetlands were considered loamy.

*Scrub-shrub Wetlands (PSS)*

One wetland feature delineated (wetland HH) within the Delineation Study Area was found to contain scrub-shrub vegetation (see Table 22-7). These scrub-shrub wetlands within the Delineation Study Area were characterized by dense stands of shrub species less than 20 feet tall, including willows (*Salix spp*.) and common buttonbush. Herbaceous vegetation in these areas included reed canary grass, swamp milkweed, spotted jewelweed, and various sedges. Evidence of wetland hydrology in the scrub-shrub wetlands included oxidized rhizospheres on living roots and microtopographic relief.

*Emergent Wetlands (PEM)*

A total of 16 wetland features within the Delineation Study Area contained emergent vegetation communities (see Table 22-7). These wetland features are dominated by herbaceous vegetation, and generally characterized by soils

that remain saturated or inundated throughout the year. Although the Cowardin classification was used to classify wetlands, some of the emergent wetlands in this category could be best described as wet meadow (i.e., portions of wetlands W, BB and FF) (Reschke, 1990). Wet meadow wetlands are usually found in poorly drained, low-lying depressional areas. Wet meadow wetlands may resemble grasslands and are typically drier than emergent marshes, except during periods of seasonal high water. They generally lack standing water for most of the year, though snow melt, storm water runoff, and/or a high water table allows the soil to remain saturated for a significant portion of the growing season.

Emergent wetlands and wet meadows identified in the Delineation Study Area were typically dominated by plants such as smallspike false nettle, sedges, swamp milkweed, rough and creeping bentgrass, reed canary grass, common rush and poverty rush (*Juncus tenuis*), spotted jewelweed, and common marsh bedstraw (*Galium palustre*). Evidence of wetland hydrology in the emergent wetlands identified within the Delineation Study Area included drainage patterns, surface soil cracks, oxidized rhizospheres on living roots, saturated soils, sparsely vegetated concave surface, algal mats or crusts, microtopographic relief, and saturation visible on aerial imagery. The majority of soils sampled within emergent wetlands were considered loamy F6 Redox Dark Surface soils. These include low chroma matrix with dark brown to black colors (10YR 2/1) and high chroma mottles (7.5YR 5/6) throughout the matrices. However, several delineated emergent wetlands also consisted of the problematic hydric soil indicator Very Shallow Dark Surface due to the shallow bedrock that is present throughout the island.

**Table 22-6. Delineated Wetlands**

| Delineation ID[1] | Latitude of Centroid | Longitude of Centroid | Wetland Type Acreage Within Wetland Study Area[2] | | | Total Wetland Acreage Within Wetland Study Area | Federal Jurisdiction[3] | State Jurisdiction[4] | Appendix A: Figure 7 - Sheet # |
|---|---|---|---|---|---|---|---|---|---|
| | | | PFO | PEM | PSS | | | | |
| B | 43.891260 | -76.439830 | | 0.0004 | | 0.0004 | Yes | | 20 |
| D | 43.891820 | -76.440350 | | 0.03 | | 0.03 | Yes | | 19, 20 |
| E | 43.892210 | -76.442710 | | 0.03 | | 0.03 | Yes | | 19 |
| J | 43.892190 | -76.442260 | 0.14 | | | 0.14 | Yes | | 19, 20 |
| G | 43.892650 | -76.432210 | 0.07 | | | 0.07 | Yes | Yes | 21 |
| H | 43.913980 | -76.391750 | 0.04 | 0.11 | | 0.15 | Yes | | 4, 5 |
| I | 43.917260 | -76.391720 | | 0.088 | | 0.09 | Yes | Yes | 3 |
| L | 43.904570 | -76.430790 | 0.46 | | | 0.46 | Yes | | 17 |
| M | 43.905250 | -76.428620 | 0.35 | | | 0.35 | Yes | | 14, 15, 16 |
| N | 43.909970 | -76.421460 | | 0.68 | | 0.68 | Yes | | 13 |
| O | 43.901880 | -76.411290 | | 0.36 | | 0.36 | Yes | Yes | 11, 12 |
| R | 43.915120 | -76.396621 | | 0.36 | | 0.36 | Yes | | 7 |
| T | 43.913960 | -76.396410 | 0.14 | | | 0.14 | Yes | Yes | 6 |

| Delineation ID[1] | Latitude of Centroid | Longitude of Centroid | Wetland Type Acreage Within Wetland Study Area[2] | | | Total Wetland Acreage Within Wetland Study Area | Federal Jurisdiction[3] | State Jurisdiction[4] | Appendix A: Figure 7 - Sheet # |
|---|---|---|---|---|---|---|---|---|---|
| | | | PFO | PEM | PSS | | | | |
| V | 43.908520 | -76.394090 | | 0.80 | | 0.80 | Yes | | 8 |
| W | 43.905220 | -76.399410 | 0.07 | | | 0.07 | Yes | Yes | 9, 10 |
| BB | 43.908870 | -76.423460 | | 0.27 | | 0.27 | Yes | | 14 |
| CC | 43.916870 | -76.391320 | | 0.04 | | 0.04 | Yes | Yes | 3, 4 |
| EE | 43.893750 | -76.440800 | | 0.12 | | 0.12 | Yes | | 18 |
| FF | 43.894180 | -76.440750 | | 0.12 | | 0.12 | Yes | | 18 |
| MM | 43.890670 | -76.440280 | | 0.07 | | 0.04 | Yes | | 20 |
| HH | 43.919980 | -76.399120 | | 0.32 | 0.09 | 0.41 | Yes | Yes | 2 |
| JJ | 43.921230 | -76.389770 | 0.05 | 0.49 | | 0.54 | Yes | | 1 |

[1]Field ID assigned by EDR.
[2]Wetland community types are based upon the Cowardin et al. (1979) classification system: PSS = Palustrine Scrub-Shrub, PEM = Palustrine Emergent, and PFO = Palustrine Forested.
[3]Based on visual observation of hydrologic connectivity in the field and review of available spatial data. Final jurisdictional determination to be made by USACE.
[4]Based on existing NYSDEC mapping of freshwater wetlands.

(k) Wetland Functional Assessment

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

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

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

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

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

Wetlands functions and values recognized under Article 24 (§24-0105) of the Environmental Conservation Law are similar to those described in the Supplement, and include:

1. Flood and storm control by the hydrologic absorption and storage capacity of wetlands;
2. Breeding, nesting and feeding habitat for many forms of wildlife, including migratory wildfowl and rare species such as the bald eagle and osprey;
3. Protection of subsurface water resources and recharge of ground water supplies;
4. Recreation by providing areas for hunting, fishing, boating, hiking, bird watching, photography, camping and other uses;
5. Pollution treatment by serving as biological and chemical oxidation basins;
6. Erosion control by serving as filtering basins, absorbing silt and organic matter and protecting channels and harbors;
7. Education and scientific research by providing outdoor bio-physical laboratories, living classrooms and training/education resources;
8. Open space and aesthetic appreciation by providing often the only remaining open areas along crowded river fronts and coastal regions;
9. Sources of nutrients in freshwater food cycles and nursery grounds and sanctuaries for fish.

Based on "Considerations/Qualifiers" outlined in the USACE Supplement, EDR developed a spreadsheet that includes several basic considerations that help identify the primary functions and values provided by wetlands. These considerations include observed vegetation conditions, hydrologic conditions, size, adjacent area conditions, and the availability of public access. The spreadsheet containing results of the qualitative assessment is included as Appendix B of the Wetland Delineation Report (Appendix FF). Specific conditions within each of these delineated wetlands were also defined to allow each wetland's functions and values to be evaluated based on data collected during field delineation. All 35 wetlands identified within the Delineation Study Area were entered into the spreadsheet and the various wetland characteristics identified for each. Based on these data, the primary functions and values provided by each wetland were determined. Typical functions and values of the delineated wetlands within the Facility Site included providing minor or major wildlife habitat, groundwater recharge/discharge, nutrient removal/retention/transformation, and flood flow alteration. Functions and values were only evaluated for areas where vegetation, soils and hydrological

data were collected as part of a formal delineation (i.e., functions/values assessments were not conducted for approximated wetlands). Many of the delineated wetlands contain the invasive species of pale swallow-wort either sparsely populated within or heavily present along the edges and outside of the wetlands. This characteristic decreases wetland quality and likely reduces the functions of wildlife habitat and production export.

(l) Offsite Wetlands Analysis

As described in above in section (i), wetland boundaries outside of the Delineated Study Area were mapped using interpretation of aerial imagery signatures, on-site observations, analysis of topography, and the results of the 2008 on-site delineation for the Hounsfield Wind Farm (C&S and TES, 2008). This mapping was used to inform an analysis of hydrological connections to offsite wetlands, including those that are State-mapped wetlands protected by NYSDEC (see Figure 22-3).

The analysis of hydrological connections also identified four State-mapped wetlands that are hydrologically connected to delineated and approximated wetlands. These include State-mapped wetlands GL-1, GL-2, GL-3, and GL-4. State wetland GL-3 is hydrologically connected to approximate wetlands within 500 feet of proposed Facility components, but does not appear to be hydrologically connected to any delineated wetlands in the Delineation Study Area. Delineated wetlands that are hydrologically connected to State-protected wetlands may be considered jurisdictional by NYSDEC under the Freshwater Wetlands Act (Article 24 and Title 23 of Article 71 of the Environmental Conservation Law [ECL]). Such delineated wetlands are outlined in Table 22-7 below.

**Table 22-7. Mapped NYSDEC Wetlands and Corresponding Connected Delineated Wetlands**

| Wetland ID | Type[1] | NYSDEC Wetland ID | NYSDEC Wetland Class |
|---|---|---|---|
| Wetland AAA | PFO | GL-4 | 2 |
| Wetland CC | PEM | GL-1 | 2 |
| Wetland G | PFO | GL-4 | 2 |
| Wetland I | PEM | GL-1 | 2 |
| Wetland O | PEM | GL-2 | 3 |
| Wetland U | PEM | GL-2 | 3 |
| Wetland T | PFO | GL-2 | 3 |
| Wetland W | PFO | GL-2 | 3 |

[1]PEM = palustrine emergent marsh, PFO = palustrine forested.

With respect to State jurisdiction under ECL Article 24, NYSDEC may identify its authority as to any delineated and verified wetland that meets State criteria. This included an assessment of delineated and approximated wetlands that meet the NYSDEC's 12.4 acre size threshold (including any wetlands with discernable surface hydrological connections which function as a unit in providing wetland benefits, pursuant to 6 NYCRR Part 664, or otherwise meet State criteria for jurisdiction (e.g., wetlands determined to be of Unusual Local Importance pursuant to 6 NYCRR 664.7(c)). One new wetland complex was identified within the Facility Site that meets these criteria. Wetlands U, HH, and II, and the approximated wetland it connects to covers an area of approximately 14 acres and therefore may be considered jurisdictional by NYSDEC under the Freshwater Wetlands Act.

(m) Wetland Impacts

During construction, potential direct or indirect impacts to wetlands may occur as a result of the installation of the barge landing, access roads, buried electrical interconnects, and the development and use of temporary workspaces around the turbine sites. The turbines themselves have been sited outside of wetlands. Direct impacts, including clearing of vegetation, earthwork (excavating and grading activities), and the direct placement of fill in wetlands, are typically associated with the development of access roads and workspaces around turbines. The construction of access roads is anticipated to result in both permanent (loss of wetland acreage) and temporary impacts to wetlands. The development and use of temporary workspaces will result in only temporary impacts to wetlands. The installation of buried electrical collection lines will temporarily disturb wetlands during construction as a result of clearing (brushhogging, or similar clearing method requiring no removal of rooted woody plants), and soil disturbance from burial of the electrical collection lines. Indirect impacts to wetlands and surface waters may result from sedimentation and erosion caused by adjacent construction activities (e.g., removal of vegetation and soil disturbance). This indirect impact may occur at wetlands adjacent to work areas where no direct wetland impacts are anticipated, including areas adjacent to proposed access road upgrade/construction, electrical collection routes, turbine sites, staging area(s), met towers, or the substation.

Construction of the Facility is anticipated to result in disturbance of up to 1.71 acres of wetlands. Of this disturbance, 1.68 acres will be disturbed only temporarily, while 0.03 acres are anticipated to be permanently lost. Based on the mapping exercise conducted in section (l) above, there are approximately 350 acres of wetlands on Galloo Island. Temporary impact from the construction of the Facility would result in approximately 0.05% of the wetlands on island being disturbed, while Facility operation would result in permanent disturbance of less than 0.01% of on-island wetlands being disturbed. Temporary and permanent impacts to wetlands for each wetland proposing to be impacted are presented below in Table 22-8.

**Table 22-8. Wetland Impacts**

| Wetland ID[1] | Type[2] | NYSDEC Wetland ID | Temporary Wetland Impact (square feet) | Permanent Wetland Impact (square feet) | Forested Wetland Conversion (square feet) | Facilities Crossing Wetland[3] | Preliminary Design Drawings[3] Sheet #: | Figure 22-4 Sheet # |
|---|---|---|---|---|---|---|---|---|
| Wetland JJ | PFO | -- | 2,204 | 0 | 2,204 | WT | C-101 | 1 |
| Wetland JJ | PEM | -- | 21,162 | 0 | 0 | WT | C-101 | 1 |
| Wetland I | PEM | GL-1 | 929 | 0 | 0 | BI | C-103 | 2 |
| Wetland CC | PEM | GL-1 | 120 | 0 | 0 | BI | C-103 | 2 |
| Wetland H | PEM | -- | 1,195 | 389 | 0 | AR | C-103 | 3 |
| Wetland V | PEM | -- | 1,124 | 0 | 0 | WT | C-104 | 5 |
| Wetland W | PFO | GL-2 | 3,196 | 0 | 1,758 | WT | C-105 | 6 |
| Wetland O | PEM | GL-2 | 6,908 | 0 | 0 | WT | C-105 | 7 |
| Wetland O | PEM | GL-2 | 1,803 | 934 | 0 | AR/BI | C-106 | 8 |
| Wetland BB | PEM | -- | 2,381 | 0 | 0 | WT | C-116 | 10 |
| Wetland M | PFO | -- | 1,221 | 0 | 0 | BI | C-116 | 10 |
| Wetland M | PFO | -- | 320 | 0 | 320 | WT | C-117 | 10 |
| Wetland M | PFO | -- | 462 | 0 | 462 | AR | C-117 | 11 |
| Wetland L | PFO | -- | 19,845 | 0 | 19,845 | WT | C-117 | 11 |
| Wetland G | PFO | GL-4 | 2,920 | 0 | 2,920 | WT | C-125 | 14 |
| Wetland EE | PEM | -- | 1,302 | 0 | 0 | AR | C-124 | 15 |
| Wetland FF | PEM | -- | 515 | 0 | 0 | AR/BI | C-124 | 15 |
| Wetland E | PEM | -- | 1,290 | 0 | 0 | WT | C-124 | 16 |
| Wetland J | PFO | -- | 3,442 | 0 | 3,442 | WT | C-126 | 16 |
| Wetland J | PFO | -- | 779 | 0 | 0 | AR/BI | C126 | 16 |
| Wetland MM | PEM | -- | 107 | 0 | 0 | AR | C-126 | 16 |
| **Total Square Feet** | | | **73,225** | **1,323** | **30,951** | | | |
| **Total Acres** | | | **1.68** | **0.03** | **0.71** | | | |

[1] Wetlands with the same ID may appear more than once in the table in cases where wetlands are mapped as separate polygons. For example, wetlands that consist of more than one wetland community are mapped as different polygons.
[2] PEM = palustrine emergent marsh, PFO = palustrine forested.
[3] Includes facilities that cause temporary or permanent impacts. BI = buried interconnect, AR = access road, WT = wind turbine.
[4] See Appendix J Preliminary Design Drawings.

In addition to impacts to wetlands, the construction and operation of the Facility will result in temporary and permanent impacts to areas within 100 feet of ECL Article 24 wetlands (as mapped and described above in section (l)). The total impact to regulated adjacent areas is anticipated to be approximately 5.15 acres. Of this area, 4.54 acres will experience temporary disturbance while 0.60 acres will be permanently lost. This small area of permanent loss to 100-foot adjacent uplands is unavoidable. The Applicant's avoidance and minimization of impacts to these wetlands are described below in section (n). Table 22-9 summarizes impacts at each 100-foot adjacent area to be impacted by the Facility.

**Table 22-9. Impacts to 100-Foot Upland Areas Adjacent to Article 24 Wetlands**

| NYSDEC Wetland ID | Delineated Wetland ID | Temporary Impact (square feet) | Temporary Impact (acres) | Permanent Impact (square feet) | Permanent Impact (acres) | Facilities Crossing Adjacent Area[1] | Preliminary Design Drawings[2] Sheet #: | Figure 22-4 Sheet # |
|---|---|---|---|---|---|---|---|---|
| GL-1 | Wetland I | 14,418 | 0.33 | 0 | 0 | AR/BI/WT | C-103 | 2 |
| GL-1 | Wetland CC | 11,488 | 0.26 | 0 | 0 | BI | C-103 | 2 |
| **GL-1 Total Impact:** | | **25,906** | **0.59** | **0** | **0** | | | |
| Unmapped Wetland 1 | Wetland U | 644 | 0.01 | 0 | 0 | AR | C-111 | 4 |
| **Unmapped-1 Total Impact:** | | **644** | **0.01** | **0** | **0** | | | |
| GL-2 | Wetland T | 14,257 | 0.33 | 7,020 | 0.16 | AR | C-111 | 4 |
| GL-2 | Wetland T | 262 | 0.01 | 0 | 0 | WT | C-111 | 4 |
| GL-2 | Wetland W | 44,833 | 1.03 | 0 | 0 | WT | C-105 | 6 |
| GL-2 | Wetland O | 44,639 | 1.02 | 2,448 | 0.06 | WT | C-105 | 7 |
| GL-2 | Wetland O | 20,463 | 0.47 | 16,841 | 0.39 | AR/BI | C-106 | 8 |
| **GL-2 Total Impact:** | | **124,454** | **2.86** | **26,309** | **0.60** | | | |
| GL-4 | Wetland AAA | 14,291 | 0.33 | 0 | 0 | WT | C-121 | 9 |
| GL-4 | -- | 621 | 0.01 | 0 | 0 | WT | C-108 | 12 |
| GL-4 | -- | 2,383 | 0.05 | 0 | 0 | WT | C-123 | 13 |
| GL-4 | Wetland G | 29,727 | 0.68 | 0 | 0 | WT | C-125 | 14 |
| **GL-4 Total Impact:** | | **47,022** | **1.08** | **0** | **0** | | | |
| **Total Impact** | | **198,026** | **4.54** | **26,309** | **0.60** | | | |

[1] Includes facilities that cause temporary or permanent impacts. BI = buried interconnect, AR = access road, WT = wind turbine.
[2] See Appendix J Preliminary Design Drawings.

(n) Measures to Avoid/Mitigate Wetland Impacts

*Avoidance*

The Facility layout was designed, in part, through an iterative process of identifying wetland locations and siting Facility components to avoid and minimize impacts to surface waters and wetlands wherever practicable. The revised Facility layout achieves this by locating turbines outside of wetlands, routing access roads and collection lines around wetlands where practicable, and utilizing existing crossings. Where such avoidance was not practicable (typically where linear wetlands were encountered), narrow portions of the wetlands were chosen for crossing locations. As indicated in Table 22-8 above, wetland impacts have been avoided and minimized substantially.

Unavoidable permanent impacts will occur to 0.009 acre (389 square feet) of delineated wetland H as a result of construction of an access road. This access road was sited to utilize an existing island road and wetland crossing.

Shifting the access road in this location would result in greater impact to wetlands and would also create additional engineering constraints. Similarly, permanent impacts will also occur to NYSDEC wetland GL-2/delineated wetland O as a result of access road construction. This loss of 0.02 acre (5,362 square feet) will occur in an area currently used as an island road. The access road was sited in this area to utilize the natural constriction point and shifting this road would result in substantially more impact to NYSDEC wetland GL-2. Therefore, permanent impacts have been sited to avoid wetlands to the maximum extent partible.

Unavoidable impacts to the adjacent area of NYSDEC Wetland GL-1/delineated wetland I will occur as a result of permanent loss, approximately 0.16 acre, will be converted to access road adjacent to NYSDEC wetland GL-2/delineated wetland T. The location of the access road in this area was chosen to utilize an existing island road and corridor (see Figure 22-5 Photo _). Unmanaged understory in this area is dominated by the invasive pale swallow-wort, following construction mowed road edges would potentially allow for grasses to outcompete the pale swallow-wort and provide increased habitat for wildlife (see Figure 22-5 Photo _). Permanent unavoidable impacts to 0.06 acre (2,448 square feet) to the adjacent upland area of NYSDEC wetland GL-2/delineated wetland O will occur as the result of turbine crane pad construction. Shifting the crane pad is not feasible in order to maintain distances to existing on island infrastructure and access roads. Vegetation in this area is comprised almost entirely of pale swallow-wort and as stated previously provides little to no beneficial habitat to species on island. Finally, impacts of 0.39 acre (16,841 square feet) to the adjacent area of NYSDEC wetland GL-2/delineated wetland O are unavoidable from the construction of an access road. This access road will utilize an existing island road wetland crossing and the narrowest portion of the wetland Figure 22-5 Photo __). Shifting this access road would cause substantially more impact to NYSDEC wetland GL-2 and adjacent areas. As demonstrated above, the Applicant has worked to avoid and minimize impacts to NYSDEC adjacent areas to the maximum extent practicable.

An 84-turbine layout, proposed and ultimately approved by the NYSDEC, for the Hounsfield Wind Farm that was to be located on Galloo Island. The layout for the 84-turbine layout would have resulted in permanent impacts to 0.165 acre of wetlands. Therefore, this proposed layout represents an 81% reduction in permanent wetland impacts. See Exhibit 9 for a comparison of other impacts from the previous Hounsfield Layout(s) and the currently proposed layout.

*Mitigation*

Despite avoiding and minimizing wetland impacts where practicable, some wetland impacts are unavoidable. The construction of the Facility will ultimately result in a permanent impact of 0.03 acre of wetlands within the Facility Site that are both federally and State jurisdictional. The point of interconnection (POI) substation in Oswego that is part of the Related Transmission Facility (RTF) (permitted through Article VII) is anticipated to result in the loss of up to 0.07

acre of federally jurisdictional wetlands. Therefore, the impacts to USACE jurisdictional wetlands for the Article 10 Facility and the RTF is anticipated to be under the USACE's threshold for mitigation (0.1 acre).

Where impacts to NYSDEC-regulated wetlands and 100-foot adjacent areas are deemed unavoidable, wetland mitigation is required. To mitigate the Facility's impacts to the State-regulated wetland adjacent area, the Applicant is proposing to enhance wetland buffers within the Facility Site. The goal of this mitigation will be to provide enhanced wetland buffer functions and values relative to those provided by the State-regulated wetland adjacent areas being lost or altered. With respect to mitigating impacts to Freshwater Wetlands, 6 NYCRR 663.5 (g) states the following:

> *(1) The applicant may suggest a proposal to enhance the existing benefits provided by a wetland or to create and maintain new wetland benefits in order to increase the likelihood that a proposed activity will meet the applicable standards for permit issuance. Such a proposal must meet the following provisions:*
>
> > *(i) the mitigation must occur on or in the immediate vicinity of the site of the proposed project;*
> > *(ii) the area affected by the proposed mitigation must be regulated by the act and this Part after mitigative measures are completed; and*
> > *(iii) the mitigation must provide substantially the same or more benefits that will be lost through the proposed activity.*
>
> *(2) Any mitigation considered as part of a permit granted pursuant to this Part will be included as a condition on such permit and must be complied with as mandatory if other work is started or completed.*
>
> *(3) If mitigation proposed does not totally compensate for lost values or benefits that would be lost by the proposed activity, then the net loss of benefits must be assessed. Any unmitigated net loss of wetland values must then be weighed according to standards contained in section 663.5 of this Part.*

The Facility will include unavoidable temporary impacts to 4.54 acres of NYSDEC-regulated adjacent area. Following construction, a native seed mix will be applied to help promote regeneration of native species. This area will provide enhanced functions and values to nearby wetlands by the removal of the highly invasive pale swallow-wort. Unavoidable minor permanent impacts to approximately 0.6 acres of NYSDEC-regulated 100-foot adjacent area will occur as a result of construction of the proposed Facility. However, as stated above, the removal of pale swallow-wort along areas impacted temporarily this Facility will enhance specific functions and values that are provided by the on-site wetlands. Article 24 of the Environmental Conservation Law, section 24-0105 (statement of findings) lists several benefits of freshwater wetlands that are protected by NYSDEC, including enhancement of wildlife habitat. The invasive species best management practices that will be followed throughout construction will enhance wildlife habitat. The Facility Site is heavily infested by pale swallow-wort except for within wetlands, see Appendix C of the Wetland Delineation Report for representative photos of upland areas surrounding wetlands. As mentioned previously, areas that will be cleared for the Facility will follow the ISCP for management of invasive species and will remove, treat, and

dispose of invasive plants during construction. This process will have beneficial impacts on wildlife value and overall quality of the wetlands by removing invasive plant species and restoring the natural habitat for wildlife species along the side of proposed access roads, along collection lines, and around turbine sites. The Facility will result in an overall increase of wetland functions and values on Galloo Island and will therefore offset any minor fringe disturbances that may occur during construction.

Indirect impacts to wetlands resulting from construction could include siltation and degradation of downstream water quality. These impacts are not anticipated as a result of this Facility, because the Applicant will take appropriate measures to prevent these impacts, including implementing a SWPPP. Specific mitigation measures for indirect impacts to wetlands include:

- *No Equipment Access Areas:* Except where crossed by permitted access roads or through non-jurisdictional use of temporary matting, wetlands will be designated "No Equipment Access," thus prohibiting the use of motorized equipment in these areas.
- *Restricted Activities Area:* A buffer zone of 100 feet, referred to as "Restricted Activities Area," will be established where Facility construction traverses wetlands and other bodies of water. Restrictions will include:
    - No deposition of slash within or adjacent to a waterbody;
    - No accumulation of construction debris within the area;
    - Herbicide restrictions within 100 feet of a wetland (or as required per manufacturer's instructions);
    - No equipment washing or refueling within the area;
    - No storage of any petroleum or chemical material; and
    - No disposal of excess concrete or concrete washwater.
- *Sediment and Siltation Control*: A soil erosion and sedimentation control plan will be developed and implemented as part of the SPDES General Permit for the Facility. Silt fences, hay bales, and temporary siltation basins will be installed and maintained throughout Facility construction. Exposed soil will be seeded and/or mulched to assure that erosion and siltation is kept to a minimum along wetland boundaries. Specific control measures are identified in the Facility's Preliminary SWPPP, and the location of these features will be indicated on construction drawings and reviewed by the contractor and other appropriate parties prior to construction. These features will be inspected on a regular basis to assure that they function properly throughout the period of construction, and until completion of all restoration work.

A discussion of mitigation measures for impacts to surface waters and ground water is provided in Exhibit 23(b)(5), and a discussion of mitigation measures for impacts to aquatic biological resources is provided in Exhibit 23(e)(2).

*Environmental Compliance and Monitoring Program*

The Applicant is committed to developing and operating the Facility in a safe and environmentally responsible manner. In addition to the mitigation measures described above, an environmental compliance and monitoring program will be implemented as outlined below. In addition, the Applicant will provide funding for an independent, third party environmental monitor to oversee compliance with environmental commitments and permit requirements. The environmental compliance and monitoring program will include the following components:

1. Planning – Prior to the start of construction, the environmental monitors will review all environmental permits and, based upon the conditions/requirements of the permits, prepare an environmental management document (Environmental Compliance Manual) that will be utilized for the duration of the construction and operation of the Facility. This document will distill and clearly present all environmental requirements for construction and restoration included in all Facility permits and approvals, and will be designed to aid in the management of environmental issues and concerns that may arise during construction of the Facility. The Environmental Compliance Manual will include 1) copies of all issued environmental permits and approvals, 2) a compliance matrix that summarizes all relevant permit requirements and identifies the responsible party and time frame (if applicable), and 3) a Facility contact list and organizational chart.

2. Training – The environmental monitors will hold environmental training sessions that will be mandatory 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 assure that all personnel on site are aware of the permitting requirements for construction of the Facility.

3. Preconstruction Coordination – Prior to construction, the contractor(s) and the environmental monitors will conduct a walkover of areas to be affected by construction activities. The limits of work areas, especially in and adjacent to sensitive resource areas such as wetlands, will be defined by flagging, staking or fencing prior to construction, as needed. This walkover will identify sensitive resources, limits of clearing, proposed wetland crossings, and placement of sediment and erosion control features. Specific construction procedures will be discussed within the group, and updated to become part of the Facility layout and construction sequence, as needed. The pre-construction site review will serve as a critical means of identifying any required changes in the construction of the Facility early enough in the process to avoid potential delays once construction has begun. Proposed changes to

the construction plan will be identified as soon as possible, as changes may require an agency notification period and take time for approval to be received.

4. Construction and Restoration Inspection – The monitoring program will include daily inspection of construction work sites by the environmental monitor. The environmental monitor is the primary individual(s) responsible for overseeing and documenting compliance with environmental permit conditions on the Facility Site. 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 jurisdictional/sensitive areas. When on-site, the environmental monitor's schedule will include participation in a daily Plan of Day (POD) meeting with the contractors to obtain schedule updates, identify in-field monitoring priorities, and address any observed or anticipated compliance issues. During the course of each visit, multiple operations are likely to be occurring throughout the Facility Site, and will need to be monitored by the environmental monitor. Activities with the potential to impact jurisdictional/sensitive resources, or with greater potential for environmental impact, will receive priority attention from the environmental monitor. For instance, installation of an access road adjacent to a protected wetland would likely receive greater attention than installation of buried electrical collection lines across grass lands. However, some level of field inspection by the environmental monitor will occur at all earth-disturbing work sites during each site visit. The monitor will keep a log of daily construction activities, and will issue periodic/regular (typically weekly) reporting and compliance audits. Additionally, when construction is nearing completion in certain portions of the Facility Site, the monitor will work with the contractors to create a punch list of areas in need of restoration in accordance with all issued permits.

(o) State and Federal Endangered or Threatened Species

See the discussion of State and federal threatened and endangered species documented within or adjacent to the Facility Site, along with potential impacts in Section (f) above. Discussion of mitigation for wildlife and wildlife habitat is provided in Section (g) and Section (h)(3) above.

(p) Invasive Species Prevention and Management Plan

An invasive species control plan (ISCP) is described above in section (b) and attached as Appendix Y.

(q) Agricultural Impacts

Approximately 165 acres of the Facility Site has been used for agricultural activity (i.e., growing hay to maintain recreational hunting on the property). Total impact to croplands are anticipated to be approximately 38.9 acres

in which approximately 20.2 acres will be temporary and approximately 18.6 acres will be permanent (see Table 22-2 in section (b) above). Work proposed within this area will consist of access roads, collection lines, and turbine sites. However, all impacts will occur on land owned by the Applicant. The land is not in certified agriculture districts and no plan is in place to grow commercial crops to support regional or statewide agriculture efforts. Therefore, no impacts to traditional agriculture lands will occur. Following construction, all disturbed agricultural areas will be decompacted with a deep ripper or heavy-duty chisel plow. In areas where the topsoil was stripped, soil decompaction will be conducted prior to topsoil replacement. Following decompaction, all rocks 4 inches and larger in size will be removed from the surface of the subsoil prior to replacement of the topsoil. The topsoil will be replaced to original depth and the original contours will be reestablished where possible. These steps will make any agricultural land disturbed as a result of construction of the Facility suitable for future agricultural use.

## REFERENCES


American Wind Energy Association (AWEA). 2015. *Wind Energy Industry Announces New Voluntary Practices to Reduce Overall Impacts to Bats by 30 Percent.* Press Release. Available at: http://www.awea.org/MediaCenter/pressrelease.aspx?ItemNumber=7833. Accessed June, 2017.

C&S Engineers (C&S), and Terrestrial Environmental Specialists, Inc. (TES). 2008. *Wetlands and Waterways Delineation Report.* Upstate NY Power Corp, Galloo Island Wind Farm. Town of Hounsfield, Jefferson, New York.

Edinger, G.J., D.J. Evans, S. Gebauer, T.G. Howard, D.M. Hunt, and A.M. Olivero (editors). 2014. *Ecological Communities of New York State.* Second Edition. A revised and expanded edition of Carol Reschke's Ecological Communities of New York State. New York Natural Heritage Program, New York State Department of Environmental Conservation, Albany, NY.

Environmental Laboratory. 1987. *Corps of Engineers Wetland Delineation Manual.* Technical Report Y-87-1. U.S. Army Corps of Engineers: Waterways Experiment Station; Vicksburg, MS.

Erickson, W. P., G. D. Johnson, D. P. Young, D. Strickland, R. Good, M. Bourassa, K. Bay, and K. Sernka. 2002. *Synthesis and Comparison of Baseline Avian and Bat Use, Raptor Nesting and Mortality Information from Proposed and Existing Wind Developments*. Technical report prepared for Bonneville Power Administration, Portland, Oregon by WEST, Inc., Cheyenne, Wyoming. December 2002. http://www.bpa.gov/Power/pgc/wind/Avian_and_Bat_Study_12-2002.pdf

Erickson, W. P., M. M. Wolfe, K. J. Bay, D. H. Johnson, and J. L. Gehring. 2014. *A Comprehensive Analysis of Small Passerine Fatalities from Collisions with Turbines at Wind Energy Facilities*. PLoS ONE 9(9): e107491. doi: 10.1371/journal.pone.0107491.

Evans, William R. 2008a. *2008 Breeding Bird Study of Big Galloo Island, Jefferson County, NY.* Prepared for Upstate New York Power Corp. Prepared by Old Bird Inc. Ithaca, NY.

Evans, William R. 2008b. *2008 Acoustic Study of avian Night Migration on Big Galloo Island.* Prepared for Upstate New York Power Corp. Prepared by Old Bird Inc. Ithaca, NY.

Evans, William R. 2008c. *2007-2008 Winter Bird Surveys Big Galloo Island, NY.* Prepared for Upstate New York Power Corp. Prepared by Old Bird Inc. Ithaca, NY.

Evans, William R. 2008d. *2008 Diurnal Bird Movement Study on Big Galloo Island, Jefferson County, NY.* Prepared for Upstate New York Power Corp. Prepared by Old Bird Inc. Ithaca, NY.

Evans, William R. 2009a. *2009 Breeding Bird Study of Big Galloo Island, Jefferson County, NY.* Prepared for Upstate New York Power Corp. Prepared by Old Bird Inc. Ithaca, NY.

Evans, William R. 2009b. *2008-2009 Winter Bird Surveys Big Galloo Island, NY.* Prepared for Upstate New York Power Corp. Prepared by Old Bird Inc. Ithaca, NY.

Evans, William R. 2009c. *2009 Diurnal Bird Movement Study on Big Galloo Island, Jefferson County, NY.* Prepared for Upstate New York Power Corp. Prepared by Old Bird Inc. Ithaca, NY.

Evans, William R. 2015. *2015 Diurnal Bird Movement Study Galloo Island, Hounsfield, NY.* Prepared for Upstate New York Power Corp. Prepared by Old Bird Inc. Ithaca, NY.

Evans, William R. 2016. *2015 Breeding Bird Survey Galloo Island, Hounsfield, NY.* Prepared Apex Clean Energy, Inc. Prepared by Old Bird Inc. Ithaca, NY.

Gibbs, James P, A. Breisch, P. Ducey, G. Johnson, J. Behler, and R. Bothner. 2007. *The Amphibians and Reptiles of New York State.* Oxford University Press Inc. New York City, NY.

Hadlock, Lindsey. 2017. Tracing a Lethal Legacy: Lead Poisoning in NYS Bald Eagles. Available at: http://mediarelations.cornell.edu/2017/06/30/tracing-a-lethal-legacy-lead-poisoning-in-nys-bald-eagles/. (Accessed September 2017).

Haig, S. M., J. D'Elia, C. Eagles-Smith, J. M. Fair, J. Gervais, G. Herring, J. W. Rivers, and J. H. Schulz. 2014. The Persistent Problem of Lead Poisoning in Birds from Ammunition and Fishing Tackle. Condor 116(3): 408-428. doi: 10.1650/CONDOR-14-36.1.

Hunt, W. G., W. Burnham, C. N. Parish, K. K. Burnham, B. Mutch, and J. L. Oaks. 2006. Bullet Fragments in Deer Remains: Implications for Lead Exposure in Avian Scavengers. Wildlife Society Bulletin 34(1): 167-170.

Illinois Department of Natural Resources (IDNR). 2007. The Possible Effects of Wind Energy on Illinois Birds and Bats.

Jain, A., P. Kerlinger, R. Curry, and L. Slobodnik. 2007. *Annual Report for the Maple Ridge Wind Power Project: Post-Construction Bird and Bat Fatality Study – 2006.* Final Report. Prepared for PPM Energy and Horizon Energy and Technical Advisory Committee (TAC) for the Maple Ridge Project Study.

Jain, A., P. Kerlinger, R. Curry, and L. Slobodnik. 2008. Annual report for the Maple Ridge Wind Power Project: post-construction bird and bat fatality study - 2007. Report to PPM Energy and Horizon Energy and Technical Advisory Committee for the Maple Ridge Project Study, McLean, VA, USA.

Jain, A., P. Kerlinger, R. Curry, and L. Slobodnik. 2009a. *Annual Report for the Maple Ridge Wind Power Project: Post-Construction Bird and Bat Fatality Study - 2007*. Final report prepared for PPM Energy and Horizon Energy and Technical Advisory Committee (TAC) for the Maple Ridge Project Study. May 6, 2009.

Jain, A., P. Kerlinger, R. Curry, L. Slobodnik, and M. Lehman. 2009b. *Maple Ridge Wind Power Avian and Bat Fatality Study Report - 2008. Annual Report for the Maple Ridge Wind Power Project, Post-construction Bird and Bat Fatality Study - 2008*. Prepared for Iberdrola Renewables, Inc, Horizon Energy, and the Technical Advisory Committee (TAC) for the Maple Ridge Project Study. Prepared by Curry and Kerlinger, LLC. May 14, 2009.

Jain, A., P. Kerlinger, R. Curry, L. Slobodnik, J. Quant, and D. Pursell. 2009c. *Annual Report for the Noble Bliss Windpark, LLC, Postconstruction Bird and Bat Fatality Study - 2008*. Prepared for Noble Environmental Power, LLC by Curry and Kerlinger, LLC. April 13, 2009.

Jain, A., P. Kerlinger, R. Curry, L. Slobodnik, J. Histed, and J. Meacham. 2009d. *Annual Report for the Noble Clinton Windpark, LLC, Postconstruction Bird and Bat Fatality Study - 2008*. Prepared for Noble Environmental Power, LLC by Curry and Kerlinger, LLC. April 13, 2009.

Jain, A., P. Kerlinger, L. Slobodnik, R. Curry, and K. Russell. 2010a. *Annual Report for the Noble Clinton Windpark, LLC: Postconstruction Bird and Bat Fatality Study - 2009*. Prepared for Noble Environmental Power, LLC. Prepared by Curry and Kerlinger, LLC, Cape May, New Jersey. March 9, 2010.

Jain, A., P. Kerlinger, L. Slobodnik, R. Curry, and K. Russell. 2010b. *Annual Report for the Noble Ellenburg Windpark, LLC: Postconstruction Bird and Bat Fatality Study - 2009*. Prepared for Noble Environmental Power, LLC. Prepared by Curry and Kerlinger, LLC, Cape May, New Jersey. March 14, 2010.

Jain, A., P. Kerlinger, L. Slobodnik, R. Curry, A. Fuerst, and A. Harte. 2010c. *Annual Report for the Noble Bliss Windpark, LLC: Postconstruction Bird and Bat Fatality Study - 2009*. Prepared for Noble Environmental Power, LLC. Prepared by Curry and Kerlinger, LLC, Cape May, New Jersey. March 9, 2010.

Jain, A., P. Kerlinger, L. Slobodnik, R. Curry, and K. Russell. 2011a. *Annual Report for the Noble Altona Windpark, LLC: Postconstruction Bird and Bat Fatality Study - 2010.* Prepared for Noble Environmental Power, LLC. Prepared by Curry and Kerlinger, LLC, Cape May, New Jersey. January 22, 2011.

Jain, A., P. Kerlinger, L. Slobodnik, R. Curry, and K. Russell. 2011b. *Annual Report for the Noble Chateaugay Windpark, LLC: Postconstruction Bird and Bat Fatality Study - 2010*. Prepared for Noble Environmental Power, LLC. Prepared by Curry and Kerlinger, LLC, Cape May, New Jersey. January 22, 2011.

Jain, A., P. Kerlinger, L. Slobodnik, R. Curry, and A. Harte. 2011c. *Annual Report for the Noble Wethersfield Windpark, LLC: Postconstruction Bird and Bat Fatality Study - 2010*. Prepared for Noble Environmental Power, LLC. Prepared by Curry and Kerlinger, LLC, Cape May, New Jersey. January 22, 2011.

Johnson, G.D., W.P. Erickson, M.D. Strickland, R.E. Good, and P. Becker. 2000. *Avian and Bat Mortality Associated in the Initial Phase of the Foote Creek Rim Windpower Project, Carbon County, Wyoming: November 3, 1998-October 31, 1999*. Report to SeaWest Energy Corp. and Bureau of Land Management.

Johnson, G. D., W. P. Erickson, M. D. Strickland, M. F. Shepherd, D. A. Shepherd, and S. A. Sarappo. 2002. *Collision Mortality of Local and Migrant Birds at a Large-Scale Wind-Power Development on Buffalo Ridge, Minnesota*. Wildlife Society Bulletin 30(3): 879-887.

Kerlinger, P. 1995. How Birds Migrate. Stackpole Books, Mechanicsburg, Pennsylvania.

Kerlinger, P. 2002. *An Assessment of the Impacts of Green Mountain Power Corporation's Wind Power Facility on Breeding and Migrating Birds in Searsburg, Vermont*. Report to National Renewable Energy Laboratory, U.S. Department of Energy. Golden, CO.

Kerlinger, P., and J. Guarnaccia. 2007. *Phase I Avian Risk Assessment Roaring Brook Wind Power Project, Lewis County, NY.* Prepared for PPM Energy. July 2007.

Kerlinger, P., and J. Guarnaccia. 2009. *Breeding Bird Survey – 2009 Noble Bliss Windpark, Wyoming County, New York*. Prepared for Noble Environmental Power, LLC. Prepared by Curry & Kerlinger, LLC, Cape May Point, NJ.

Kerlinger, P., and J. Guarnaccia. 2010. *Grassland Nesting Bird Displacement Study – 2010, Noble Wethersfield Windpark, Wyoming County, New York*. Prepared for Noble Environmental Power, LLC. Prepared by Curry & Kerlinger, LLC, Cape May Point, NJ.

Leddy, K., K. Higgins, and D. Naugle. 1999. *Effects of Wind Turbines on Upland Nesting Birds in Conservation Reserve Program Grasslands*. Wilson Bulletin 111:100-104.

McGowan, K.J., and K.J. Corwin. 2008. *The Second Atlas of Breeding Birds in New York State*. Cornell University Press, Ithaca, NY.

National Research Council. 2007. *Environmental Impacts of Wind-Energy Projects*. Prepared by the Committee on Environmental Impacts of Wind Energy Projects.

North East Ecological Services (NEES). 2009. *Bat Risk Assessment and Pre-Construction Monitoring, Hounsfield Wind Farm Project, Jefferson County, New York*. Prepared for Babcock & Brown Renewable Holdings, Inc., Houston, Texas. Prepared by NEES, Bow, New Hampshire. February 2, 2009.

NEES. 2016. *Bat Survey of Galloo Island, Jefferson County NY*. Prepared for Hudson Energy Developers. Prepared by NEES, Concord, New Hampshire. May 12, 2016NYSDEC. 2007. *New York State Breeding Bird Atlas 2000 [Internet]. 2000 - 2005*. Release 1.0. Albany, New York. Updated June 11, 2007. Available at: http://www.dec.ny.gov/animals/7312.html. (Accessed January 2017).

NYSDEC. 2009. *Guidelines for Conducting Bird and Bat Studies at Commercial Wind Energy Projects*.

NYSDEC. 2016a. Bird Species Fact Sheets. Available online at: http://www.dec.ny.gov/animals/54755.html.

NYSDEC. 2016b. *Common Loon Fact Sheet*. Available at: http://www.dec.ny.gov/animals/7074.html. (Accessed May 2017).

NYSDEC. 2016c. *Great Blue Heron Fact Sheet*. Available at: http://www.dec.ny.gov/animals/61491.html. (Accessed May 2017).

NYSDEC. 2016d. *List of Endangered, Threatened and Special Concern Fish and Wildlife Species of New York State*. Available at: http://www.dec.ny.gov/animals/7494.html. (Accessed February 2016).

NYSDEC. 2016e. *Species of Greatest Conservation Need*. Available at: http://www.dec.ny.gov/animals/9406.html. (Accessed February 2016).

NYSDEC. 2017. *Direct Testimony of Brianna Denoncour and Carl J. Herzog. In the Matter of the Application of Cassadaga Wind LLC for a Certificate of Environmental Compatibility and Public Need Pursuant to Article 10 to Construct a Wind Energy Facility*. Case No.: 14-F-0490. May 12, 2017.

Old Bird Inc. 2009. Avian Risk Assessment for the Hounsfield Wind Energy Project on Galoo Island, Jefferson County, NY. Prepared for Upstate New York Power Corporation, West Seneca, New York. Prepared by Old Bird Inc., Ithaca, New York. February 2009.

Old Bird Inc. 2016. 2015 Breeding Bird Study, Galloo Island, Hounsfield, NY. Prepared for Apex Clean Energy, Inc., Charlottesville, Virginia. Prepared by Old Bird Inc., Ithaca, New York.

Ornithological Council, The. 2007. *Critical Literature Review: Impact of Wind Energy and Related Human Activities on Grassland and Shrub-Steppe Birds.* Prepared for the National Wind Consulting Council. Literature Review by S. Mabey and E. Paul. October 2007.

Pearce-Higgins, J. W., L. Stephen, R. H. W. Langston, I. P. Bainbridge, and R. Bullman. 2009. *The Distribution of Breeding Birds around Upland Wind Farms*. Journal of Applied Ecology 46(6): 1323-1331.

Pearce-Higgins, J. W., L. Stephen, A. Douse, and R. H. W. Langston. 2012. *Greater Impacts of Wind Farms on Bird Populations During Construction Than Subsequent Operation: Results of a Multi-Site and Multi-Species Analysis*. Journal of Applied Ecology 49(2): 386-394.

Rathbun N. A., T. S. Bowden, R. L. Horton, D. C. Nolfi, E. C. Olson, D. J. Larson, and J. C. Gosse. 2016. *Great Lakes Avian Radar Technical Report; Niagara, Genesee, Wayne, and Jefferson Counties, New York; Spring 2013.* U.S. Department of Interior, Fish and Wildlife Service, Biological Technical Publication FWS/ BTP-3012-2016

Ribic, C. A., R. R. Koford, J. R. Herkert, D. H. Johnson, N. D. Niemuth, D. E. Naugle, K. K. Bakker, D. W. Sample, and R. B. Renfrew. 2009. *Area Sensitivity in North American Grassland Birds: Patterns and Process*. Auk 126: 233-244.

Stantec Consulting. 2008. *Spring 2008 Radar Survey Report For the Hounsfield Wind Project On Galloo Island, New York*. Prepared for American Consulting Professionals of New York, PLLC. Prepared by Stantec Consulting, Topsham, ME.

Stantec Consulting. 2008a. *Fall 2008 Radar Survey Report For the Hounsfield Wind Project On Galloo Island, New York*. Prepared for American Consulting Professionals of New York, PLLC. Prepared by Stantec Consulting, Topsham, ME.

Stantec Consulting, Inc. (Stantec). 2009. *Post-Construction Monitoring at the Munnsville Wind Farm, New York: 2008*. Prepared for E.ON Climate and Renewables, Austin, Texas. Prepared by Stantec Consulting, Topsham, Maine. January 2009.

Stantec Consulting, Inc. (Stantec). 2010. Cohocton and Dutch Hill Wind Farms Year 1 Post-Construction Monitoring Report, 2009, for the Cohocton and Dutch Hill Wind Farms in Cohocton, New York. Prepared for Canandaigua Power Partners, LLC and Canandaigua Power Partners II, LLC, Portland, Maine. Prepared by Stantec, Topsham, Maine. January 2010.

Stantec Consulting, Inc. (Stantec). 2011. *Bird Mortality Event at Laurel Mountain Substation*. Report to the West Virginia Field Office, US Fish and Wildlife Service (USFWS), Elkins, West Virginia. Report from Stantec, Topsham, Maine. October 25, 2011.

Stantec Consulting Ltd. (Stantec Ltd.). 2011. Wolfe Island Wind Plant Post-Construction Followup Plan. Bird and Bat Resources Monitoring Report No. 5: January - June 2011. File No. 160960494. Prepared for TransAlta Corporation's wholly owned subsidiary, Canadian Renewable Energy Corporation. Prepared by Stantec Consulting Ltd., Guelph, Ontario. December 2011.

Stantec Consulting Ltd. (Stantec Ltd.). 2012. Wolfe Island Wind Plant Post-Construction Follow-up Plan. Bird and Bat Resources Monitoring Report No. 6: July-December 2011. File No. 160960494. Prepared for TransAlta Corporation's wholly owned subsidiary, Canadian Renewable Energy Corporation. Prepared by Stantec Consulting Ltd., Guelph, Ontario. July 2012.

Stantec Consulting Ltd. (Stantec Ltd.). 2014. Wolfe Island Wind Plant Post-Construction Follow-up Plan. Bird and Bat Resources Monitoring Report No. 7: January - June 2012. File No. 160960494. Prepared for TransAlta Corporation's wholly owned subsidiary, Canadian Renewable Energy Corporation. Prepared by Stantec Consulting Ltd., Guelph, Ontario. April 2014.

Strickland, M.D., E.B. Arnett, W.P. Erickson, D.H. Johnson, G.D. Johnson, M.L. Morrison, J.A. Shaffer, and W. Warren-Hicks. 2011. *Comprehensive Guide to Studying Wind Energy/Wildlife Interactions*. Prepared for the National Wind Coordinating Collaborative, Washington, DC.

Taucher, J., T. Librandi-Mumma, and W. Capouillez. 2012. *Pennsylvania Game Commission Wind Energy Voluntary Cooperation Agreement Third Summary Report.* Bureau of Wildlife Habitat Managmenet, Pennsylvania Game Commission (PGC), Harrisburg, Pennsylvania. December 27, 2012.

Terrestrial Environmental Specialists, Inc. (TES). 2009. *Ecological Resources Report*. Upstate NY Power Corp, Galloo Island Wind Farm. Town of Hounsfield, Jefferson, New York.

Tidhar, D., L. McManus, Z. Courage, and W. L. Tidhar. 2012a. *2010 Post-Construction Fatality Monitoring Study and Bat Acoustic Study for the High Sheldon Wind Farm, Wyoming County*, New York. Final Report: April 15 - November 15, 2010. Prepared for High Sheldon Wind Farm, Sheldon Energy LLC, Chicago, Illinois. Prepared by Western EcoSystems Technology, Inc. (WEST), Waterbury, Vermont. April 15, 2012.

Tidhar, D., L. McManus, D. Solick, Z. Courage, and K. Bay. 2012b. *2011 Post-Construction Fatality Monitoring Study and Bat Acoustic Study for the High Sheldon Wind Farm, Wyoming County, New York*. Final Report: April 15 - November 15, 2011. Prepared for High Sheldon Wind Farm, Sheldon Energy LLC, Chicago, Illinois. Prepared by Western EcoSystems Technology, Inc. (WEST), Waterbury, Vermont. April 25, 2012.

Tidhar, D., J. Ritzert, M. Sonnenberg, M. Lout, and K. Bay. 2013. *2012 Post-Construction Fatality Monitoring Study for the Maple Ridge Wind Farm, Lewis County, New York*. Final Report: July 12 - October 15, 2012. Prepared for EDP Renewables North, Houston, Texas. Prepared by Western EcoSystems Technology, Inc. (WEST), NE/Mid-Atlantic Branch, Waterbury, Vermont. February 12, 2013.

United States Corps of Engineers (USACE). 2012. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: North central and Northeastern Region*.

US Fish and Wildlife Service (USFWS). 2012. Land-Based Wind Energy Guidelines. March 23, 2012. 82 pp. Available online at: http://www.fws.gov/cno/pdf/Energy/2012_Wind_Energy_Guidelines_final.pdf

USFWS. 2016. *Endangered and Threatened Wildlife and Plants; 4(d) Rule for the Northern Long-Eared Bat*. Federal Register Vol. 81 (6):1900-1922. January 14, 2016.

Vickery, P. D., D. E. Blanco, and B. Lopez-Lanus. 2010. Conservation Plan for the Upland Sandpiper (Bartramia longicauda). Version 1.1. Manomet Center for Conservation Sciences, Manomet, Massachusetts.

Western Ecosystems Technology, Inc. (WEST). 2017. *Galloo Island Wind Conservation Plan*. Prepared for Gallo Island Wind, LLC. Prepared by West, Inc. Environmental & Statistical Consultants, Cheyenne, WY.

Wiggins, D. A., D. W. Holt, and S. M. Leasure. 2006. Short-Eared Owl (Asio flammeus). A. Poole, ed. The Birds of North America Online. Cornell Lab of Ornithology. Ithaca, New York.

Young, D. P., Jr., D. Strickland, W. P. Erickson, K. J. Bay, R. Canterbury, T. Mabee, B. Cooper, and J. Plissner. 2004. *Baseline Avian Studies, Mount Storm Wind Power Project, Grant County, West Virginia, May 2003 - March 2004.* Final Report. Technical report prepared for NedPower Mount Storm, LLC, Chantilly, Virginia, by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming, Concord College, Athens, West Virginia, and ABR, Inc., Forest Grove, Oregon. April 23, 2004. 141 pp.