Stantec

Memo

To:	TRC	From:	Stantec Consulting Services Inc.
File:	195601170	Date:	August 11, 2017

Reference: Analysis of Potential Habitat Fragmentation Impacts to Songbirds and Bats Associated with the Eight Point Wind Project, New York

INTRODUCTION

Forest habitat fragmentation occurs when large blocks of contiguous forest are divided or broken into smaller patches as a result of removal or conversion. Fragmentation can occur at a variety of scales and patterns, and may affect individual species differently depending on the habitat needs of the species present. The potential effects of forest habitat fragmentation depend in part on previous land use, the original extent of intact forested habitat, the extent of habitat that will be impacted during and after construction, and the behavioral sensitivity of potentially affected species or species groups, which include both residents and migrants. The relative impacts of forest habitat removal or conversion also depend on the configuration of impacted areas, the presence or absence of similar forest habitat proximal to the impacted area, and the types and level of activity (e.g., traffic volume, noise levels, visual disturbances) expected in the affected areas. Impacts to species as a result of forest fragmentation may vary temporally and may have short-term or long-term effects depending on the species.

This memo assesses the potential for construction of the proposed Eight Point Wind Project (Project) to result in habitat-related impacts to breeding songbird and bat populations and has been prepared as a supplement to the Project's Article 10 permit application.

EXPECTED PROJECT EFFECTS ON FOREST HABITATS

For the spatial scope of this analysis, we considered the 'Project area' the minimum-convex polygon encompassing the anticipated clearing limits for turbines, access roads, collector lines, and transmission corridor[1]. The Project area consists of approximately 39,000 acres, of which 24,000 acres (62%) are forested (Figure 1). Existing land uses in and around the Project area include pasture, agriculture, and to a lesser extent, low-density residential and road development. Existing forested habitat at the Project consists of mostly hardwood forest stands composed of American beech (*Fagus grandifolia*), sugar maple (*Acer saccharum*), hickories (*Carya spp*.) and oaks (*Quercus spp*.). The southern and northern portions of the Project area are relatively fragmented. The central portion of the Project area contains a relatively large forest block (~1,500 acres) that is bisected by east-west-oriented Route 248 and Marsh Creek. The proposed transmission line runs for approximately 16.5 miles through both fragmented and intact forested areas. Eight turbines—numbers 8, 13, 15, 16, 19, 20, Alt 3, and Alt 4—are located in the interior portion of relatively non-fragmented forest blocks that are approximately 1,000 acres or larger (Figure 1). Based on a coarse and conservative estimate that considers clearing limit buffers specific to each type of infrastructure (i.e., 250-ft radius

[1] We adopted this definition of 'Project area' from the U.S. Fish and Wildlife Service's final eagle rule (81 FR 91494; USFWS 2016) for this habitat fragmentation analysis. This definition is an appropriate method for evaluating potential impacts to wildlife species, but at this project represents a larger spatial scale than using parcel boundaries that contain Project infrastructure.

for turbines, 30 ft on either side of access roads, 25 ft on either side of collector lines and 50 ft on either side of the transmission line), it is expected that clearing for all Project components may remove 280 forested acres (i.e., approximately 1% of forested habitat in the Project area).

OVERVIEW OF FRAGMENTATION EFFECTS ON SONGBIRDS

The categorization of bird species as "forest-interior specialists", "interior-edge generalists", "edge species", or "field-edge species", as outlined by Whitcomb et al. (1981) and modified by Freemark and Collins (1992), can be useful in conceptual understanding of potential impacts of habitat fragmentation (Villard 1998). Forest-interior habitat located deep within woodlands is sheltered from influences of forest edges and open habitats. Bird species that utilize forest interior habitat (forest-interior species) prefer these sheltered conditions due to availability of certain types of food, less nest disruption, and fewer predators. Conversely, forest edge habitat is typically sunnier, warmer, drier, windier, prone to more disturbance, and supports a higher density of predators than interior habitat. Bird species that utilize forest edge (edge species) are often generalists in terms of habitat needs, are well-adapted to these conditions, and can find their nesting and foraging requirements at forest edges (LandOwner Resource Centre 2000). While such categorizations are useful in evaluating theoretical impacts of habitat fragmentation, bird species do not always conform to distinct categorizations as preferring "edge" or "interior" habitats. Also, continued presence of a species in an area affected by habitat removal or conversion does not necessarily indicate that the reproductive success of that species has been unaffected.

POTENTIAL FRAGMENTATION EFFECTS FROM THE EIGHT POINT WIND PROJECT

Pre-construction surveys were conducted in accordance with a work plan that was developed in consultation with the NYSDEC and the U.S. Fish and Wildlife Service (Service). Pre-construction breeding bird survey results and point counts conducted during spring and fall migration provide baseline data and an opportunity to assess potential impacts to residents and migrants associated with habitat fragmentation resulting from development and operation of the Project. The breeding bird community was evaluated in both forest habitat and non-forest habitat, which included field and forest edge. For figures showing survey locations, methods, and results, refer to *2016 Pre-Construction Avian and Bat Surveys, Eight Point Wind Energy Center* (Stantec 2017a) and *2017 Pre-Construction Spring Migrating Bird Survey, Eight Point Wind Energy Center* (Stantec 2017b).

During breeding bird surveys, as expected, most of the forest-interior individuals were observed in forest habitat and not in non-forest habitat (13 species, 54%; Table 1). Eleven interior-species were observed in non-forest, indicating variation in the habitat used at the Project by forest interior birds during the breeding season. Breeding bird surveys were not designed to quantify reproductive success rates, so that information is unavailable.

Observations of forest-interior species during spring and fall migration surveys were common, with approximately the same total number of forest-interior bird observations recorded during these two surveys as during the breeding bird survey (Table 2). Four species observed during the spring and fall migration surveys that were not observed during the breeding bird survey included blackburnian warbler (*Setophaga fusca*), brown creeper (*Certhia americana*), red-breasted nuthatch (*Sitta canadensis*), and ruffed grouse (*Bonasa umbellus*).

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Table 1. Number of observations and locations of forest-interior species observed during breeding bird surveys at treatment points, Eight Point Wind Project, Spring 2016.

Forest-Interior Species	Scientific Name	Non-forest total (26 points)	Forest total (30 points)	All points total (56 points)	% observed in forested habitat
American redstart	*Setophaga ruticilla*	5	1	6	16.7
blackpoll warbler	*Setophaga striata*	1	0	1	0
black-throated blue warbler	*Setophaga caerulescens*	0	3	3	100.0
black-throated green warbler	*Setophaga virens*	0	14	14	100.0
blue-headed vireo	*Vireo solitarius*	0	1	1	100.0
Cape May warbler	*Setophaga tigrina*	0	1	1	100.0
chestnut-sided warbler	*Setophaga pensylvanica*	7	3	10	30.0
common raven	*Corvus corax*	0	2	2	100.0
dark-eyed junco	*Junco hyemalis*	4	27	31	87.1
eastern towhee	*Pipilo erythrophthalmus*	26	8	34	23.5
eastern wood-pewee	*Contopus virens*	0	3	3	100.0
great crested flycatcher	*Myiarchus crinitus*	0	1	1	100.0
hermit thrush	*Catharus guttatus*	1	0	1	0
ovenbird	*Seiurus aurocapilla*	0	57	57	100.0
red-bellied woodpecker	*Melanerpes carolinus*	0	2	2	100.0
red-eyed vireo	*Vireo olivaceus*	1	33	34	97.1
scarlet tanager	*Piranga olivacea*	3	7	10	70.0
veery	*Catharus fuscescens*	0	3	3	100.0
white-breasted nuthatch	*Sitta carolinensis*	0	3	3	100.0
winter wren	*Troglodytes hiemalis*	0	4	4	100.0
wood thrush	*Hylocichla mustelina*	1	10	11	90.9
yellow-rumped warbler	*Setophaga coronata*	2	0	2	0
Total		**51**	**183**	**234**	

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Table 2. Number of observations and locations of forest-interior species observed during spring and fall migration surveys at treatment points, Eight Point Wind Project, 2016.

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

The pre-construction surveys indicate that the Project area supports a diversity of songbirds typically found in similar habitats in the region, including a variety of fragmentation-sensitive forest-interior species. Forest-interior species such as ovenbird (*Seiurus aurocapilla*), red-eyed vireo (*Vireo olivaceus*), scarlet tanager (*Piranga olivacea*), and wood thrush (*Hylocichla mustelina*) (all observed during breeding bird surveys) are sensitive to fragmentation and may experience reproductive dysfunction as a result of forest fragmentation (Donovan and Flather 2002). Ground or open-nesting species should be most sensitive to fragmentation, and may experience low nesting success due to nest predation and nest parasitism (Lampila et al. 2005). Species in this category include ovenbird and veery (Cornell University 2015). Ovenbirds were frequently observed at the Project site at forest

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

points and not at non-forest points. Few veerys were documented (n = 3). The forest interior species observed in the Project area are regionally common and none is federally or state-listed (NYSDEC 2015a). One species, Cape May warbler (*Setophaga tigrina*), is a High Priority New York Species of Greatest Conservation Need (SGCN), and three species, black-throated blue warbler (*Setophaga caerulescens*), scarlet tanager, and wood thrush, are SGCN experiencing some level of population decline (NYSDEC 2015b).

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

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

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

Summary of Expected Habitat Fragmentation Effects on Birds

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

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

POTENTIAL EFFECTS OF FRAGMENTATION ON BATS

Potential effects of habitat fragmentation on bats are not well understood. Fragmentation may affect two aspects of bat ecology: foraging and roosting.

Potential mechanisms of impact may vary among species but could include increased parasitism and/or predation, narrowed niche breadth, or shifts in home ranges (Segers and Broders 2014). Forest structure plays an important role in determining the suitability of foraging habitat, with different species selecting foraging habitat according to their prey preferences and flight morphology. Large bats such as migratory hoary bats (*Lasiurus cinereus*), eastern red bats (*Lasiurus borealis*), and silver-haired bats (*Lasionycteris noctivagans*) tend to be less maneuverable and prey on larger insects (Aldridge and Rautenbach 1987; Fenton 1990). As a result, these species tend to forage in open habitats or above the forest canopy. Small, highly maneuverable bats such as northern long-eared bats (*Myotis septentrionalis*) and eastern small-footed bats (*Myotis leibii*) typically forage closer to the ground, often beneath the forest canopy. Many bat species forage along forest edges, riparian corridors, and other gaps in the forest. Accordingly, having a matrix of forest types and structural elements including gaps, edges, and corridors likely increase the overall diversity of bat species in an area, provided a sufficient amount of roost opportunities and access to water exists (Krusic et al. 1996).

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

A rare bat acoustic survey was conducted at the Project in July and August 2016 (Stantec 2017a). The survey used 43 detectors placed throughout the Project area in corridor habitat (linear, cleared features), edge habitat, and forest canopy openings (small openings surrounded mostly by forest). The survey detected species known to occur in New York, and species were relatively evenly distributed among the three habitat types surveyed. As described above, a small percentage of the existing forested habitats within the Project area will be cleared, and remaining corridor, edge, and forest habitat should provide ample foraging opportunity for bats. Further, impacts to wetland resources, which provide preferred foraging habitat for many bat species in the region, will be avoided. It is unlikely that the species composition of bats at the Project will change considerably as a result of forest clearing during Project construction.

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

Summary of Expected Habitat Fragmentation Effects on Bats

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

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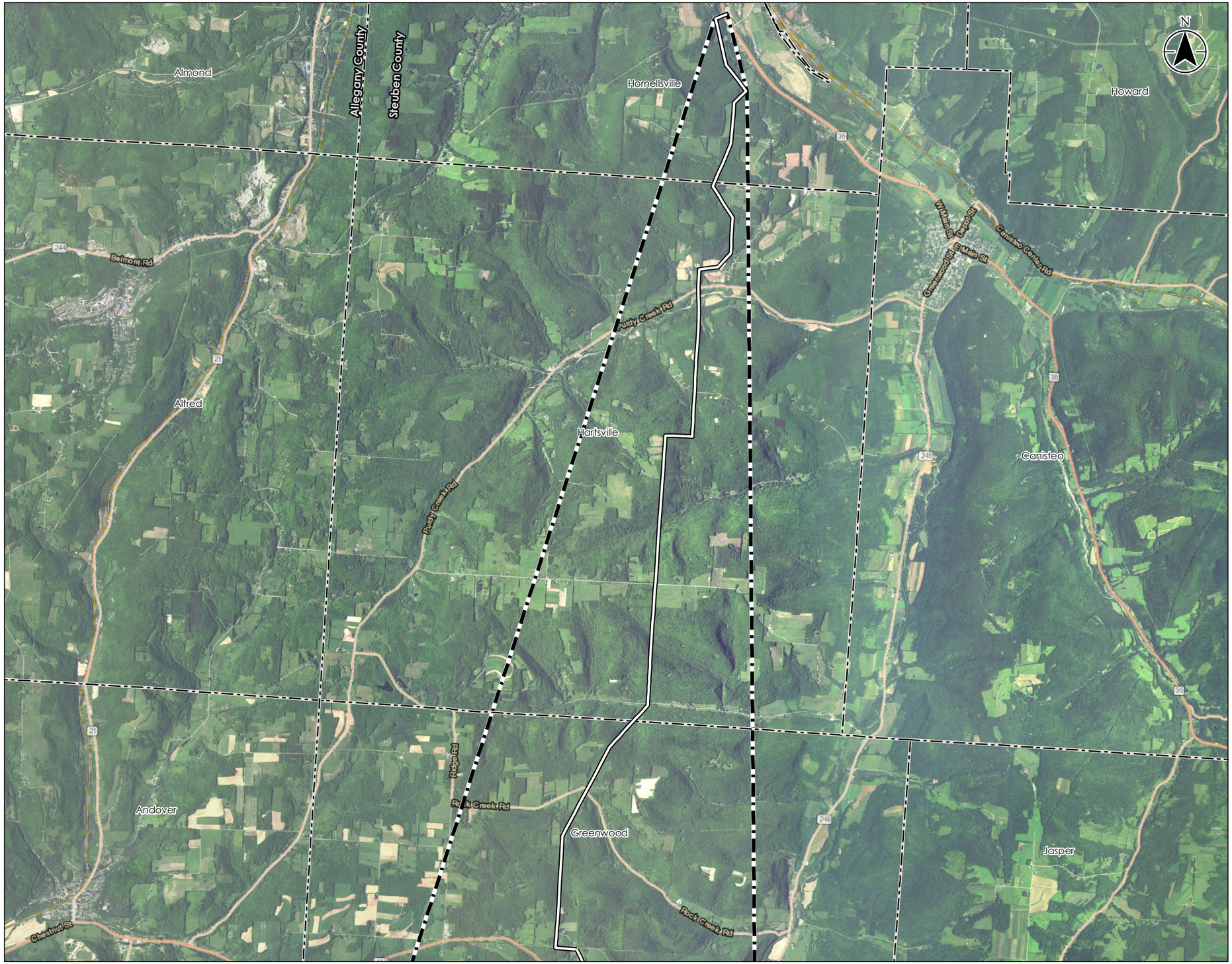
Attachment: Figure 1 – Proposed Infrastructure Locations



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Legend

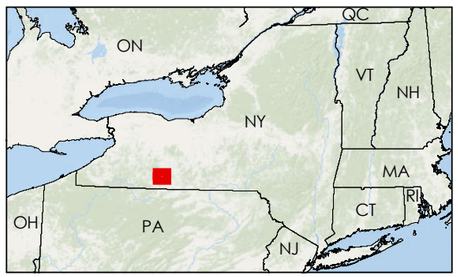
- Proposed Turbine Location (6/21/2017)
- Proposed Transmission Line (6/21/2017)
- Proposed Access Road (6/21/2017)
- Proposed Collector (6/21/2017)
- Minimum Convex Polygon Project Area
- Town Boundary
- County Boundary
- State Boundary

0 6,000 12,000 Feet

1" = 6,000 feet (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 18N
2. Orthophoto: NAIP 2015



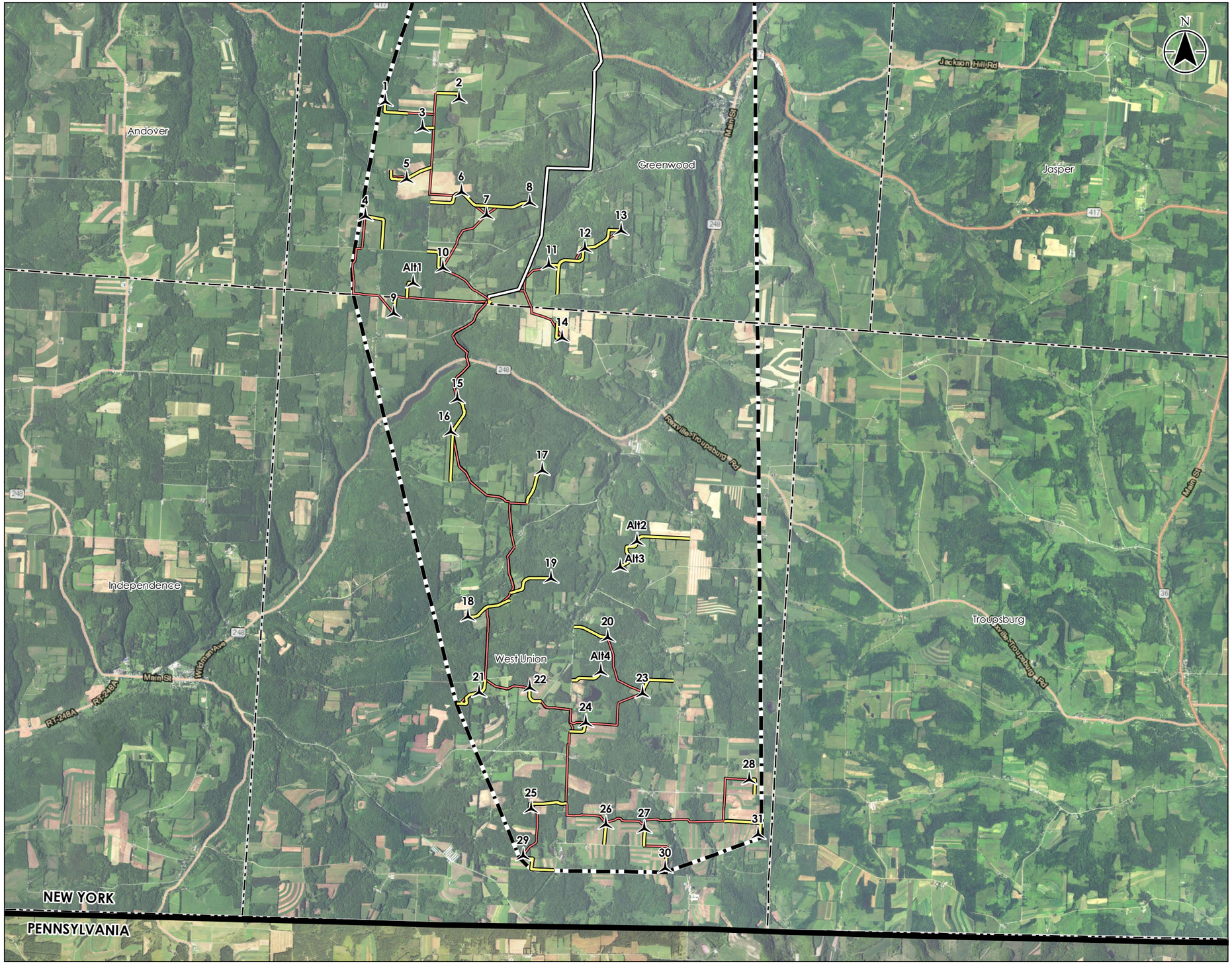
Project Location
Steuben County, New York

195601170
Prepared by GAC on 2017-06-27
Reviewed by SBG on 2017-06-27

Client/Project
Eight Point Wind, LLC
Eight Point Wind Energy Center

Figure No.
1 (1 of 2)

Title
Project Infrastructure Locations



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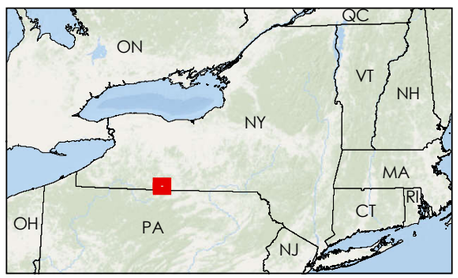

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Figure No.
1 (2 of 2)

Title
Project Infrastructure Locations