8.7 Avifauna

The Project site features predominantly mixed wood forest, as well as significant coverage of mature to overmature softwood forest. Much of the forested area is managed for silviculture and has been subject to clear-cutting or thinning activities within the past decade. Three areas of wetland habitat exist at the Project site, in the form of treed swamps, some of which occur in open areas that may have been disturbed by forestry activities. The diversity of habitat types, in particular the prevalence of edge/transitional habitat, provides for the foraging, breeding, and roosting requirements of a variety of resident and migratory bird species. Baseline information was utilized to gain insight into protected avifauna habitats, species utilization of the area, and to identify SOCI potentially occurring at or near the Project site.

The closest Important Bird Area (IBA) in Canada (IBA Canada 2016) is the Southern Bight, Minas Basin IBA located approximately 9 km northwest of the Project site. This IBA is a 22,190 ha staging ground for an estimated 1 to 2 million shorebirds in late July to early August. A high diversity of migrant shorebirds forage on the large intertidal mud and sand flats throughout the Bight. This area is also a designated Ramsar Wetland Site as it supports the largest numbers of mixed species of shoreline birds during fall migration in all of North America.

The Project site is contained within map square 20MQ17 of the Maritime Breeding Bird Atlas (MBBA) (MBBA 2012). In the most recent edition of the MBBA (2006-2010), 94 species were identified as being possible, probable, or confirmed breeders within this area. The following SOCI are considered possible, probable, or confirmed breeders in the survey area:

- American Bittern (Botaurus lentiginosus) – “Sensitive” (NSDNR), “S3S4B” (ACCDC);
- Bank Swallow (*Riparia riparia*) – “Threatened” (NS *ESA)*, “Threatened” (COSEWIC), “May be at Risk” (NSDNR), “S3B” (ACCDC);
- Barn Swallow (*Hirundo rustica*) – “Endangered” (NS *ESA*), “Threatened” (COSEWIC), “Sensitive” (NSDNR), “S3B” (ACCDC);
- Black-backed Woodpecker (Picoides arcticus) – “Sensitive” (NSDNR), “S3S4” (ACCDC);
- Blackpoll Warbler (Dendroica striata) – “Sensitive” (NSDNR), “S3S4B” (ACCDC);
- Bobolink (*Dolichonyx oryzivorus*) – “Vulnerable” (NS *ESA*), “Threatened” (COSEWIC), “Sensitive” (NSDNR), “S3S4B” (ACCDC);
- Boreal Chickadee (*Poecile hudsonicus*) – “Sensitive” (NSDNR), “S3” (ACCDC);
- Common Loon (*Gavia immer*) – “May be at Risk” (NSDNR), “S3B, S4N” (ACCDC);
- Common Nighthawk (*Chordeiles minor*) – “Threatened” (SARA), “Threatened” (NS *ESA*), “Threatened” (COSEWIC), “At Risk” (NSDNR), “S3B” (ACCDC);
- Eastern Kingbird (*Tyrannus tyrannus*) – “Sensitive” (NSDNR), “S3S4B” (ACCDC);
- Eastern Phoebe (*Sayornis phoebe*) – “Senstive” (NSDNR), “S3S4B” (ACCDC);
- Eastern Wood-Pewee (*Contopus virens*) – “Vulnerable” (NS *ESA*), “Special Concern” (COSEWIC), “Sensitive” (NSDNR), “S3S4B” (ACCDC);
- Golden-crowned Kinglet (*Regulus satrapa*) – “Senstivie” (NSDNR);
- Gray Catbird (*Dumetella carolinensis*) – “May be at Risk” (NSDNR), “S3B” (ACCDC);
- Gray Jay (*Perisoreus canadensis*) – “Sensitive” (NSDNR), “S3S4” (ACCDC);
- Killdeer (*Charadrius vociferous*) – “Sensitive” (NSDNR), “S3S4B” (ACCDC);

- Olive-sided Flycatcher (Contopus cooperi) – "Threatened" (SARA), "Threatened" (NS *ESA*), "Threatened" (COSEWIC), "At Risk" (NSDNR), "S3B" (ACCDC);
- Pied-billed Grebe (Podilymbus podiceps) – "Sensitive" (NSDNR), "S3B" (ACCDC);
- Pine Grosbeak (*Pinicola enucleator*) – "May be at Risk" (NSDNR), "S3?B,S5N" (ACCDC);
- Pine Siskin (*Spinus pinus*) – "Sensitive" (NSDNR), "S3S4B, S5N" (ACCDC);
- Ruby-crowned Kinglet (*Regulus calendula*) – "Senstive" (NSDNR);
- Savannah Sparrow (Passerculus sandwichensis) – "Special Concern" (SARA), "Special Concern (COSEWIC);
- Spotted Sandpiper (*Actitis macularius*) – "Sensitive" (NSDNR), "S3S4B" (ACCDC);
- Tennessee Warbler (*Vermivora peregrine*) – "Sensitive" (NSDNR); and
- Tree Swallow (*Tachycineta bicolor*) – "Sensitive" (NSDNR).

The NS Significant Species and Habitats database contains 524 unique records pertaining to birds and/or bird habitat within a 100 km radius of the Project site. These records include:

- 141 classified in the database as "Other Habitat", of which the majority relate to Bald Eagle (*Haliaeetus leucocephalus*) (94) and Osprey (*Pandion haliaetus*) (33), but also including records of Great Blue Heron (*Ardea herodias*) (4) and unclassified Cormorant species (3), among others;
- 178 records classified as "Species of Concern", of which the majority relate to Common Loon (126), but also including records of unclassified Tern species (10), Nelson's Sharp-tailed Sparrow (16), Common Tern (*Sterna hirundo*) (6), Osprey (3), Northern Goshawk (*Accipiter gentilis*) (2), and Great Blue Heron (4), among others;
- 74 records classified as "Migratory Bird", including Double-crested Cormorant (*Phalacrocorax auritus*) (10), Great Blue Heron (10), unclassified shorebirds (27), American Black Duck (*Anas rubripes*) (6), and Common Eider (*Somateria mollissima*) (4), among others; and
- 131 records classified as "Species at Risk", primarily relating to Common Loon (97), Bald Eagle (97), Piping Plover (*Charadrius melodus*) (8), Peregrine Falcon (*Falco peregrinus*) (7) and Harlequin Duck (*Histrionicus histrionicus*) (5) but also including records of Roseate Tern (*Sterna dougallii*) (2) and Common Tern (2), among others.

Multiple significant habitat features related to birds are present within a 10 km radius of the Project site (Table 8.8).

Table 8.8: Significant Habitat Features Related to Birds within a 10km Radius of the Project Site

Site	Species	Location	Distance and Direction from Project Site
HN35	Bald Eagle Nest (Possible Inactive)	Along Panuke Lake	0.3 km to the N
HN285	Common Loon Nesting	Panuke Lake	0.5 km to the W
HN300	Common Loon Nesting	Five Mile Lake	5.0 km to the E
HN301	Common Loon Nesting	Mill Lakes	5.9 km to the W
HN28	Bald Eagle Nest (Possible Inactive)	Along Mill Lakes	7.5 km to the W

Source: NSDNR 2016

The ACCDC database contains records of 115 bird species within a 100 km radius of the Project site. Table 8.9 lists these species as well as their respective provincial and national conservation status ranks.

Table 8.9: Bird Species Recorded within a 100 km Radius of the Project Site

Common Name	Scientific Name	*SARA* Status[1]	NS *ESA* Status[2]	COSEWIC Status[3]	NSDNR Status[4]	NS S-Rank[5]
American Bittern	*Botaurus lentiginosus*	Not Listed	Not Listed	Not Listed	Sensitive	S3S4B
American Coot	*Fulica americana*	Not Listed	Not Listed	Not At Risk	Undetermined	S1B
American Golden-Plover	*Pluvialis dominica*	Not Listed	Not Listed	Not Listed	Sensitive	S1S2M
American Kestrel	*Falco sparverius*	Not Listed	Not Listed	Not Listed	Secure	S3B
Arctic Tern	*Sterna paradisaea*	Not Listed	Not Listed	Not Listed	May be at Risk	S3B
Atlantic Puffin	*Fratercula arctica*	Not Listed	Not Listed	Not Listed	Sensitive	S3B,S5N
Baltimore Oriole	*Icterus galbula*	Not Listed	Not Listed	Not Listed	May be at Risk	S2S3B
Bank Swallow	*Riparia riparia*	Not Listed	Not Listed	Threatened	May be at Risk	S2S3B
Barn Swallow	*Hirundo rustica*	Not Listed	Endangered	Threatened	At Risk	S3B
Bay-breasted Warbler	*Dendroica castanea*	Not Listed	Not Listed	Not Listed	Sensitive	S3S4B
Bicknell's Thrush	*Catharus bicknelli*	Special Concern	Endangered	Threatened	At Risk	S1S2B
Black Tern	*Chlidonias niger*	Not Listed	Not Listed	Not At Risk	May be at Risk	S1B
Black-backed Woodpecker	*Picoides arcticus*	Not Listed	Not Listed	Not Listed	Sensitive	S3S4
Black-bellied Plover	*Pluvialis squatarola*	Not Listed	Not Listed	Not Listed	Secure	S3M
Black-billed Cuckoo	*Coccyzus erythropthalmus*	Not Listed	Not Listed	Not Listed	May be at Risk	S3B
Black-headed Gull	*Chroicocephalus ridibundus*	Not Listed	Not Listed	Not Listed	Secure	S3N
Black-legged Kittiwake	*Rissa tridactyla*	Not Listed	Not Listed	Not Listed	Sensitive	S3B,S5N
Blackpoll Warbler	*Dendroica striata*	Not Listed	Not Listed	Not Listed	Sensitive	S3S4B
Blue-winged Teal	*Anas discors*	Not Listed	Not Listed	Not Listed	May be at Risk	S3S4B
Bobolink	*Dolichonyx oryzivorus*	Not Listed	Vulnerable	Threatened	Sensitive	S3S4B
Boreal Chickadee	*Poecile hudsonica*	Not Listed	Not Listed	Not Listed	Sensitive	S3
Boreal Owl	*Aegolius funereus*	Not Listed	Not Listed	Not At Risk	Undetermined	S2?B
Brant	*Branta bernicla*	Not Listed	Not Listed	Not Listed	Sensitive	S2M

Common Name	Scientific Name	*SARA* Status[1]	NS *ESA* Status[2]	COSEWIC Status[3]	NSDNR Status[4]	NS S-Rank[5]
Brown Thrasher	*Toxostoma rufum*	Not Listed	Not Listed	Not Listed	Undetermined	S1B
Brown-headed Cowbird	*Molothrus ater*	Not Listed	Not Listed	Not Listed	Secure	S2B
Buff-breasted Sandpiper	*Tryngites subruficollis*	Not Listed	Not Listed	Special Concern	Accidental	SNA
Bufflehead	*Bucephala albeola*	Not Listed	Not Listed	Not Listed	Secure	S3S4N
Canada Warbler	*Wilsonia canadensis*	Threatened	Endangered	Threatened	At Risk	S3S4B
Cape May Warbler	*Dendroica tigrina*	Not Listed	Not Listed	Not Listed	Sensitive	S2B
Chimney Swift	*Chaetura pelagica*	Threatened	Endangered	Threatened	At Risk	S2B,S1M
Cliff Swallow	*Petrochelidon pyrrhonota*	Not Listed	Not Listed	Not Listed	May be at Risk	S2S3B
Common Eider	*Somateria mollissima*	Not Listed	Not Listed	Not Listed	Secure	S3S4
Common Goldeneye	*Bucephala clangula*	Not Listed	Not Listed	Not Listed	Secure	S2B,S5N
Common Moorhen	*Gallinula chloropus*	Not Listed	Not Listed	Not Listed	Undetermined	S1B
Common Nighthawk	*Chordeiles minor*	Threatened	Threatened	Threatened	At Risk	S2S3B
Common Tern	*Sterna hirundo*	Not Listed	Not Listed	Not At Risk	Sensitive	S3B
Cooper's Hawk	*Accipiter cooperii*	Not Listed	Not Listed	Not At Risk	Undetermined	S1?B
Eastern Bluebird	*Sialia sialis*	Not Listed	Not Listed	Not At Risk	Sensitive	S3B
Eastern Kingbird	*Tyrannus tyrannus*	Not Listed	Not Listed	Not Listed	Sensitive	S3B
Eastern Meadowlark	*Sturnella magna*	Not Listed	Not Listed	Threatened	Sensitive	SHB
Eastern Wood-Pewee	*Contopus virens*	Not Listed	Vulnerable	Special Concern	Sensitive	S3S4B
Evening Grosbeak	*Coccothraustes vespertinus*	Not Listed	Not Listed	Not Listed	Secure	S3S4B,S3N
Fox Sparrow	*Passerella iliaca*	Not Listed	Not Listed	Not Listed	Secure	S3S4B
Gadwall	*Anas strepera*	Not Listed	Not Listed	Not Listed	May be at Risk	S2B
Gray Catbird	*Dumetella carolinensis*	Not Listed	Not Listed	Not Listed	May be at Risk	S3B
Gray Jay	*Perisoreus canadensis*	Not Listed	Not Listed	Not Listed	Sensitive	S3
Great Cormorant	*Phalacrocorax carbo*	Not Listed	Not Listed	Not Listed	Sensitive	S2S3
Great Crested Flycatcher	*Myiarchus crinitus*	Not Listed	Not Listed	Not Listed	May be at Risk	S1B
Greater Yellowlegs	*Tringa melanoleuca*	Not Listed	Not Listed	Not Listed	Sensitive	S3B,S3S4M
Harlequin Duck - Eastern pop.	*Histrionicus histrionicus pop. 1*	Special Concern	Endangered	Special Concern	At Risk	S2N
Horned Grebe	*Podiceps auritus*	Not Listed	Not Listed	Special Concern	Secure	S4N

Common Name	Scientific Name	*SARA* Status[1]	NS *ESA* Status[2]	COSEWIC Status[3]	NSDNR Status[4]	NS S-Rank[5]
Horned Lark	*Eremophila alpestris*	Not Listed	Not Listed	Not Listed	Secure	SHB,S4S5N
Hudsonian Godwit	*Limosa haemastica*	Not Listed	Not Listed	Not Listed	Sensitive	S1S2M
Hudsonian Whimbrel	*Numenius phaeopus hudsonicus*	Not Listed	Not Listed	Not Listed	Sensitive	S2S3M
Indigo Bunting	*Passerina cyanea*	Not Listed	Not Listed	Not Listed	Undetermined	S1?B
Killdeer	*Charadrius vociferus*	Not Listed	Not Listed	Not Listed	Sensitive	S3B
Lapland Longspur	*Calcarius lapponicus*	Not Listed	Not Listed	Not Listed	Secure	S3?N
Laughing Gull	*Leucophaeus atricilla*	Not Listed	Not Listed	Not Listed	Secure	SHB
Leach's Storm-Petrel	*Oceanodroma leucorhoa*	Not Listed	Not Listed	Not Listed	Secure	S3B,S5M
Least Sandpiper	*Calidris minutilla*	Not Listed	Not Listed	Not Listed	Secure	S1B,S3M
Lesser Yellowlegs	*Tringa flavipes*	Not Listed	Not Listed	Not Listed	Secure	S3M
Long-eared Owl	*Asio otus*	Not Listed	Not Listed	Not Listed	May be at Risk	S2S3
Marsh Wren	*Cistothorus palustris*	Not Listed	Not Listed	Not Listed	Undetermined	S1B
Nelson's Sparrow	*Ammodramus nelsoni*	Not Listed	Not Listed	Not At Risk	Secure	S3S4B
Northern Gannet	*Morus bassanus*	Not Listed	Not Listed	Not Listed	Secure	SHB,S5M
Northern Goshawk	*Accipiter gentilis*	Not Listed	Not Listed	Not At Risk	Secure	S3S4
Northern Harrier	*Circus cyaneus*	Not Listed	Not Listed	Not At Risk	Secure	S3S4B
Northern Mockingbird	*Mimus polyglottos*	Not Listed	Not Listed	Not Listed	Secure	S1B
Northern Pintail	*Anas acuta*	Not Listed	Not Listed	Not Listed	May be at Risk	S1B
Northern Shoveler	*Anas clypeata*	Not Listed	Not Listed	Not Listed	May be at Risk	S2B
Olive-sided Flycatcher	*Contopus cooperi*	Threatened	Threatened	Threatened	At Risk	S3B
Pectoral Sandpiper	*Calidris melanotos*	Not Listed	Not Listed	Not Listed	Secure	S2S3M
Peregrine Falcon - anatum/tundrius	*Falco peregrinus pop. 1*	Special Concern	Vulnerable	Special Concern	Sensitive	S1B,SNAM
Philadelphia Vireo	*Vireo philadelphicus*	Not Listed	Not Listed	Not Listed	Undetermined	S2?B
Pine Grosbeak	*Pinicola enucleator*	Not Listed	Not Listed	Not Listed	May be at Risk	S2S3B,S5N
Pine Siskin	*Carduelis pinus*	Not Listed	Not Listed	Not Listed	Sensitive	S2S3
Pine Warbler	*Dendroica pinus*	Not Listed	Not Listed	Not Listed	Undetermined	S1B
Piping Plover melodus ssp	*Charadrius melodus melodus*	Endangered	Endangered	Endangered	At Risk	S1B

Common Name	Scientific Name	*SARA* Status[1]	NS *ESA* Status[2]	COSEWIC Status[3]	NSDNR Status[4]	NS S-Rank[5]
Purple Martin	*Progne subis*	Not Listed	Not Listed	Not Listed	May be at Risk	SHB
Purple Sandpiper	*Calidris maritima*	Not Listed	Not Listed	Not Listed	Sensitive	S3?N
Razorbill	*Alca torda*	Not Listed	Not Listed	Not Listed	Sensitive	S2B,S4N
Red Crossbill	*Loxia curvirostra*	Not Listed	Not Listed	Not Listed	Secure	S3S4
Red Knot rufa ssp	*Calidris canutus rufa*	Not Listed	Endangered	Endangered	At Risk	S2M
Red Phalarope	*Phalaropus fulicarius*	Not Listed	Not Listed	Not Listed	Sensitive	S2S3M
Red-breasted Merganser	*Mergus serrator*	Not Listed	Not Listed	Not Listed	Secure	S3S4B,S5N
Red-breasted Nuthatch	*Sitta canadensis*	Not Listed	Not Listed	Not Listed	Secure	S3
Red-necked Phalarope	*Phalaropus lobatus*	Not Listed	Not Listed	Special Concern	Sensitive	S2S3M
Roseate Tern	*Sterna dougallii*	Endangered	Endangered	Endangered	At Risk	S1B
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	Not Listed	Not Listed	Not Listed	Sensitive	S2S3B
Ruby-crowned Kinglet	*Regulus calendula*	Not Listed	Not Listed	Not Listed	Sensitive	S3S4B
Ruddy Turnstone	*Arenaria interpres*	Not Listed	Not Listed	Not Listed	Secure	S3M
Rusty Blackbird	*Euphagus carolinus*	Special Concern	Endangered	Special Concern	May be at Risk	S2B
Sanderling	*Calidris alba*	Not Listed	Not Listed	Not Listed	Secure	S3M,S2N
Savannah Sparrow princeps ssp	*Passerculus sandwichensis princeps*	Special Concern	Not Listed	Special Concern	Sensitive	S1B
Scarlet Tanager	*Piranga olivacea*	Not Listed	Not Listed	Not Listed	Undetermined	S2B
Semipalmated Plover	*Charadrius semipalmatus*	Not Listed	Not Listed	Not Listed	Secure	S1B,S3S4M
Semipalmated Sandpiper	*Calidris pusilla*	Not Listed	Not Listed	Not Listed	Sensitive	S3M
Short-billed Dowitcher	*Limnodromus griseus*	Not Listed	Not Listed	Not Listed	Secure	S3M
Short-eared Owl	*Asio flammeus*	Special Concern	Not Listed	Special Concern	May be at Risk	S1S2B
Spotted Sandpiper	*Actitis macularius*	Not Listed	Not Listed	Not Listed	Sensitive	S3S4B
Swainson's Thrush	*Catharus ustulatus*	Not Listed	Not Listed	Not Listed	Secure	S3S4B
Tennessee Warbler	*Vermivora peregrina*	Not Listed	Not Listed	Not Listed	Sensitive	S3S4B
Turkey Vulture	*Cathartes aura*	Not Listed	Not Listed	Not Listed	Sensitive	S2S3B
Veery	*Catharus fuscescens*	Not Listed	Not Listed	Not Listed	Secure	S3S4B
Vesper Sparrow	*Pooecetes gramineus*	Not Listed	Not Listed	Not Listed	May be at Risk	S2B

Common Name	Scientific Name	*SARA* Status[1]	NS *ESA* Status[2]	COSEWIC Status[3]	NSDNR Status[4]	NS S-Rank[5]
Virginia Rail	*Rallus limicola*	Not Listed	Not Listed	Not Listed	Undetermined	S2S3B
Warbling Vireo	*Vireo gilvus*	Not Listed	Not Listed	Not Listed	Undetermined	S1B
Whip-Poor-Will	*Caprimulgus vociferus*	Threatened	Threatened	Threatened	At Risk	S1?B
White-rumped Sandpiper	*Calidris fuscicollis*	Not Listed	Not Listed	Not Listed	Secure	S3M
Willet	*Tringa semipalmata*	Not Listed	Not Listed	Not Listed	May be at Risk	S2S3B
Willow Flycatcher	*Empidonax traillii*	Not Listed	Not Listed	Not Listed	Sensitive	S2B
Wilson's Snipe	*Gallinago delicata*	Not Listed	Not Listed	Not Listed	Sensitive	S3B
Wilson's Warbler	*Wilsonia pusilla*	Not Listed	Not Listed	Not Listed	Sensitive	S3B
Wood Thrush	*Hylocichla mustelina*	Not Listed	Not Listed	Threatened	Undetermined	SUB
Yellow-bellied Flycatcher	*Empidonax flaviventris*	Not Listed	Not Listed	Not Listed	Sensitive	S3S4B

Source: ACCDC 2016

[1]Government of Canada 2012; [2]NS *ESA* 2013; [3]COSEWIC 2012; [4]NSDNR 2010;[5] ACCDC 2016

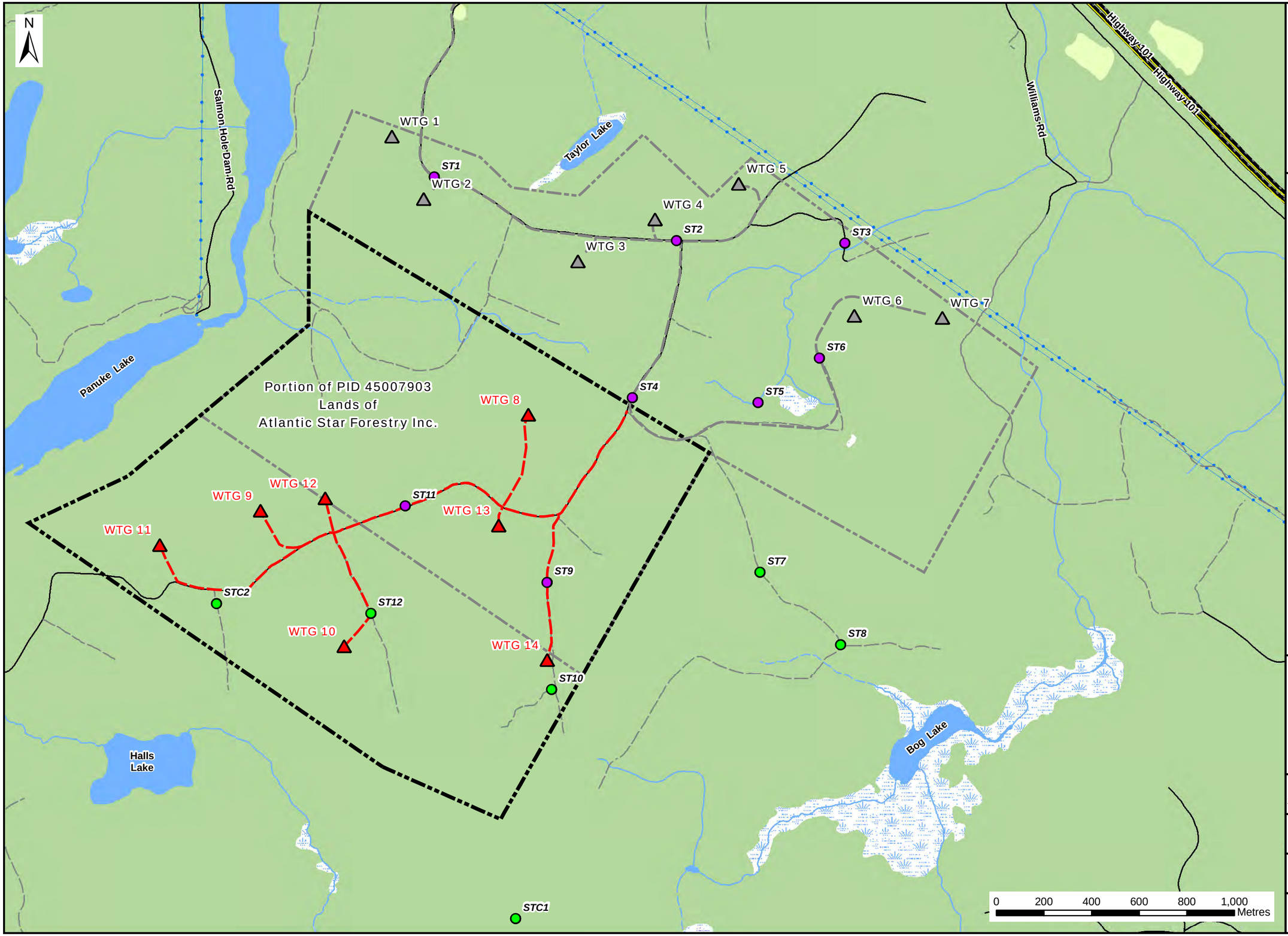
Field surveys were completed to characterize the pre-construction (baseline) bird community in the Project site area. Data collected in the Project site area in 2013 as part of the EA previously submitted for the original Ellershouse Wind Farm EA (2013) will be analyzed below, along with data collected in the fall of 2016. The 2013 data consists of a series of spring migration, breeding season, fall migration and winter bird surveys, while the 2016 data consists of data collected during two surveys conducted in the fall of 2016. The 2013 data includes a number of point counts collected both in the original Project site, as well as at control-site locations that were situated in the proposed expansion area (Drawings 8.7 and 8.8).

Surveys were designed to capture changes in the diversity and abundance of bird species in the vicinity of the Project site (*i.e.,* the Project area) coinciding with such important events as breeding and migration. All field surveys were based on a previously developed methodology designed for wind projects, in consultation with officials from NSDNR and CWS, and in accordance with protocols outlined in the document "Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds" (CWS 2007).

Detailed results and methodologies for all bird surveys are provided in Appendix G.

2013 Spring Migration Surveys – Original 2013 Project Site

Spring migration surveys were completed as part of the 2013 EA at the original Ellershouse Project site just south of the proposed 2016 expansion area. These surveys were conducted on April 29, May 5, and May 31, 2013, resulting in a total of 24 stopover count surveys, conducted at 8 locations. Of the original 8 stopover count locations, 3 are within the expansion area (Drawing 8.7). A total of



Notes:

1. Reference: Digital Topographic Mapping & Property Management Unit MU9940 by Nova Scotia Geomatics Centre.
2. Projection: NAD83(CSRS), UTM Zone 20 North.
3. Site Features & Project / Propety Boundaries are Approximate. This Plan is for Presentation only & Not Intended for Legal Use
4. GPS Data Collected is Typically to +/-5m Accuracy.

Legend:

- Existing Turbines
- Proposed Turbines

Spring/Breeding Survey Locations

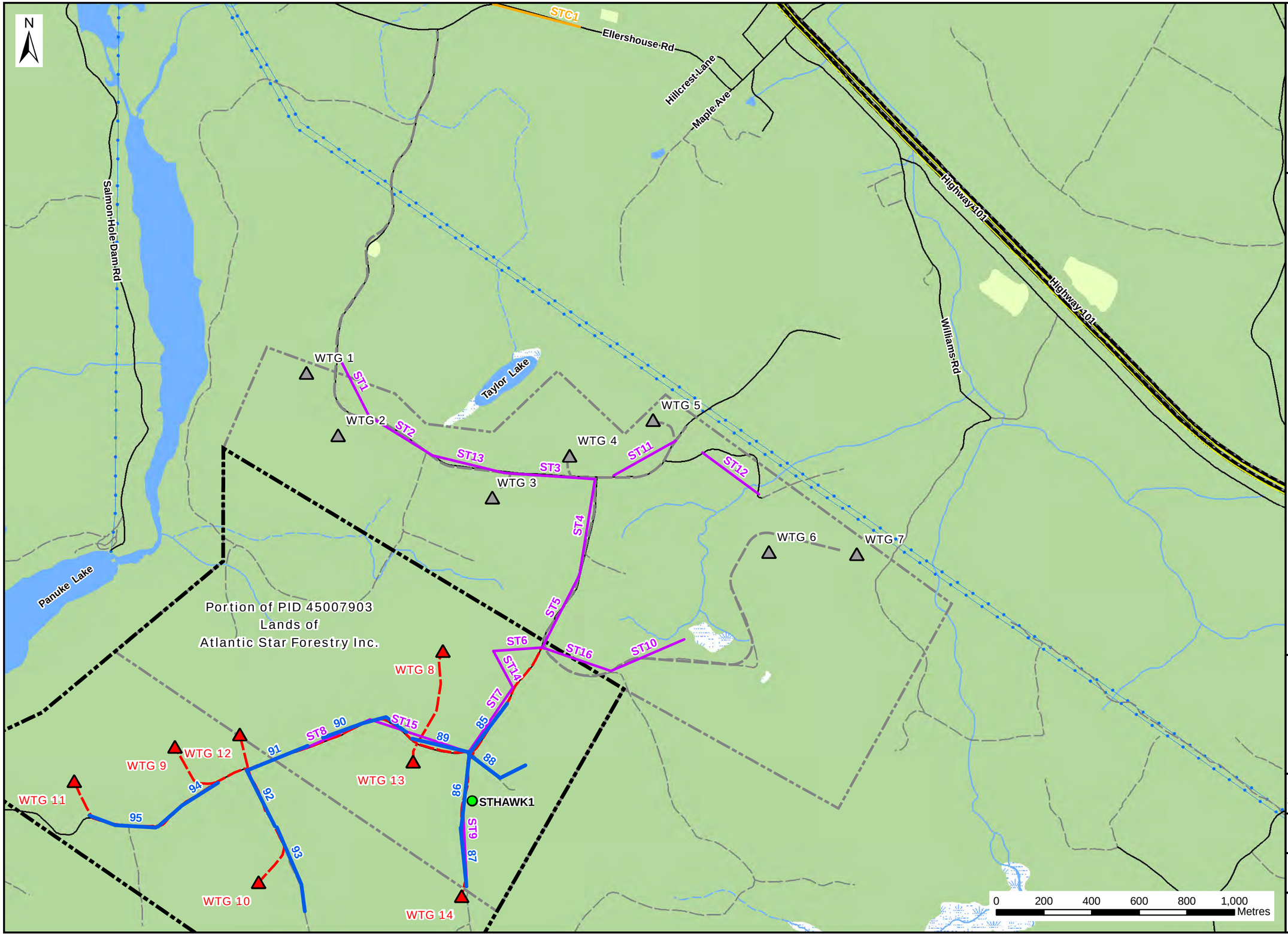
- Control Site
- On-Site
- Existing Access Road
- Proposed Access Road
- Expansion Project Site
- Former Project Site Boundary
- Major Roads and Highways
- Public Roads
- Access Roads / Trails
- Existing Transmission Lines
- Mapped Stream
- Mapped Indefinite Stream
- Water Bodies
- Mapped Wet Area
- Cleared Area

Ellershouse Wind Farm Expansion - Spring Migration /Breeding Bird Survey Locations

Strum 20 YEARS Taking Charge CONSULTING

*Engineering * Surveying * Environmental*
*Bedford * Antigonish * Moncton * Deer Lake*

Date: September 2016	Project #: 16-5807
Scale: 1:15,000	Drawing #: **8.7**
Drawn By: H. Serhan	
Checked By: S. Duncan	



Notes:

1. Reference: Digital Topographic Mapping & Property Management Unit MU9940 by Nova Scotia Geomatics Centre.
2. Projection: NAD83(CSRS), UTM Zone 20 North.
3. Site Features & Project / Propety Boundaries are Approximate. This Plan is for Presentation only & Not Intended for Legal Use
4. GPS Data Collected is Typically to +/-5m Accuracy.

Legend:

- Passage Migration Survey Location
- Existing Turbines
- Proposed Turbines
- 2016 Fall Bird Survey Transects

2013 Fall / Winter Bird Survey Transects

- Control Site
- On-Site
- Existing Access Road
- Proposed Access Road
- Expansion Project Site
- Former Project Site Boundary
- Major Roads and Highways
- Public Roads
- Access Roads / Trails
- Existing Transmission Lines
- Mapped Stream
- Mapped Indefinite Stream
- Water Bodies
- Mapped Wet Area
- Cleared Area

Ellershouse Wind Farm Expansion - Fall Migration and Winter Survey Locations

Strum 20 YEARS Taking Charge CONSULTING

*Engineering * Surveying * Environmental*
*Bedford * Antigonish * Moncton * Deer Lake*

Date: September 2016	Project #: 16-5807
Scale: 1:15,000	Drawing #: **8.8**
Drawn By: H. Serhan	
Checked By: S. Duncan	

46 species, comprising 441 individual birds, were observed during spring migration surveys at the Project site (Tables G1/G2, Appendix G). White-throated Sparrow (*Zonotrichia albicollis*), American Robin (*Turdus migratorius*), Hermit Thrush (*Catharus guttatus*), and Yellow-rumped Warbler (*Dendroica coronata*) were the most abundant and frequently observed species.

Migrant passerines accounted for 63% of the species and 80.4% of the individual birds observed during spring migration surveys at the Project site. Overall, there were 18.37 ± 0.71 (mean ± 95% confidence interval) individual birds and 11.29 ± 1.14 species observed per survey event during the spring migration at the Project site.

Spring Migration Surveys – Original 2013 Control Site

Spring migration controls-site surveys were conducted in the lands surrounding the 2013 Project site area on April 29, May 5, and May 31, 2013, resulting in a total of 12 stopover count surveys conducted at 4 locations within or near the proposed expansion area (Drawing 8.7).

A total of 43 species, comprising 216 individual birds, were observed during spring migration surveys at the Control site locations (Tables G3/4, Appendix G). Palm Warbler (*Dendroica palmarum*), White-throated Sparrow (*Zonotrichia albicollis*), and Yellow-rumped Warbler (*Dendroica coronata*), were the most abundant and commonly observed species.
The spring bird community at the Control site was dominated by migrant passerines, accounting for 60.4% of the species and 76.4% of the individual birds observed. Overall, there were 18 ± 3.78 (mean ± 95% confidence interval) individual birds and 12.08 ± 2.57 species observed per survey location during spring migration surveys at the Control site.

82.6% of species observed during spring migration at the Project site were at the 2013 Control-sites and on the 2013 Project site. Species of note that were only observed at the Project site include Barred Owl (*Strix varia*), Gray Jay (*Perisoreus canadensis*), and Sharp-shinned Hawk (*Accipiter striatus*). A one-way ANOVA indicated no significant differences in the mean number of individual birds (F= 0.034, p= 0.853) or species (F= 0.254, p= 0.617) observed per survey location during the spring migration period at the Project site compared to the Control site.

2013 Breeding Bird Surveys – Original 2013 Project Site

Six point count locations on the Project site were surveyed as part of the 2013 EA at the original Ellershouse Project site on June 18 and again on June 25, 2013, representing a total of 12 separate survey events (Drawing 8.7). Of these 6 stopover count control-site locations, 3 are located within the proposed 2016 expansion area. A total of 271 individual birds, representing 42 species, were observed during these point counts (Tables G5/6, Appendix G). Twenty-one of the observed species are considered probable breeders based upon the observance of breeding pairs and/or the establishment of permanent territories. Ovenbird (*Seiurus aurocapilla*), Black-and-white Warbler (*Mniotilta varia*), Red-eyed Vireo (*Vireo olivaceus*), and Black-throated Green Warbler (*Dendroica virens*) were the most abundant and frequently observed species during breeding bird surveys at the Project site.

Migrant passerines accounted for 64.2% of the species and 85.9% of the individual birds observed. Overall, there were 16.93 ± 2.50 (mean ± 95% confidence interval) individual birds and 12.5 ± 1.54 species observed per survey location during breeding surveys at the Project site.

Breeding Bird Surveys – Original 2013 Control Site

Six point count locations at the Control site were surveyed on June 18 and again on June 25, 2013, representing 12 separate survey events. Three of these point-count locations occurred within the proposed 2016 expansion area (Drawing 8.7). A total of 213 individual birds, representing 39 species, were observed during these point counts (Tables G7/8, Appendix G). Nineteen of the observed species are considered probable breeders based upon the observance of breeding pairs and/or the establishment of permanent territories. White-throated Sparrow, Black-throated Green Warbler (*Dendroica virens*), Ovenbird (*Seiurus aurocapilla*), and Magnolia Warbler were the most abundant and frequently observed species.

Migrant passerines accounted for 71.7% of the species and 86.8% of the individual birds observed. Overall, there were 17.75 ± 2.21 (mean ± 95% confidence interval) individual birds and 13 ± 1.29 species observed per survey location during breeding surveys at the Control site.

76.1% of the species observed during breeding bird surveys at the Project site were also observed at the Control site during that time. Species of note that were only observed at the Project site include American Woodcock (*Scolopax minor*), Canada Warbler (*Wilsonia canadensis*), Ruffed Grouse (*Bonasa umbellus*), and Yellow-throated Warbler (*Dendroica dominica*). A one-way ANOVA indicated no significant differences in the mean number of individual birds ($F= 0.210$, $p= 0.650$) or species ($F= 0.214$, $p= 0.647$) observed per survey location during the breeding season at the Project site compared to the Control site

2013 Fall Migration Surveys – Original 2013 Project Site

Fall migration surveys were also conducted in 2013 as part of the original Ellershouse wind Project EA. A total of 40 stopover count surveys were carried out at 16 transects across the original Project site during site visits on September 17, October 25, and November 13, 2013 (Drawing 8.8). Seven of these 16 transects were routed through the expansion area for the proposed project expansion.
A total of 43 species, consisting of 424 individual birds, were recorded (Tables G9/10, Appendix G). Black-capped Chickadee, Golden-crowned Kinglet and Blue Jay, all resident species, were the most abundant and frequently observed species.

Overall, migrant passerines accounted for 55.8% of the species and 32.3% of the individual birds observed during fall migration surveys at the Project site. There were 11.33 ± 3.64 (mean ± 95% confidence interval) individual birds and 5.69 ± 1.50 species observed per per stopover survey transect during fall 2013 migration at the Project site.

2013 Fall Migration Surveys - Original 2013 Control Site

Fall migration surveys at the Control site were limited to a single stopover count along the Ellershouse Road, to the north of the Project site, on October 25, 2013 (Drawing 8.8).

American Crow (*Corvus brachyrhynchos*) and Black-capped Chickadee, both species commonly associated with human habitation, were observed during this Control site survey (Table G12, Appendix G).

2016 Fall Migration Surveys – Proposed 2016 Expansion Project Site

A total of 22 stopover count surveys were conducted along 11 survey transects within the expansion area in the fall of 2016. These surveys occurred over two days on October 5th, and October 24th, 2016 (Drawing 8.8). A total of 153 birds comprised of 23 species were observed during these surveys within the expansion area (Tables G13/14, Appendix G). Black capped Chickadee (*Poecile atricapillus*), and Dark-eyed Junco (*Junco hyemalis*) were the most commonly observed species. Golden-crowned Kinglets (*Regulus satrapa*), were also well represented, as well were all four of Nova Scotia's corvid species, American Crow (*Corvus brachyrhynchos*), Common Raven (*Corvus corax*), Blue Jay (*Cyanocitta cristata*) and Gray Jay (*Perisoreus canadensis*).

Of the 23 species observed, 9 (39%), consisting of 23% of the individual bird observed were migratory. The other 14 species (61%), consisting of 77% of the individual birds observed, were resident birds. Overall, there was an average of 6.95 ± 2.28 birds observed per stopover survey during the fall 2016 surveys in the expansion area.

2013 Winter Bird Surveys – Original 2013 Project Site

A total of 14 area search surveys were carried out as part of the 2013 EA at the original Ellershouse Project site across the Project site and surrounding areas during a site visit on December 7, 2013 (Drawing 8.8). Of the 14 area searches, 5 were completed within the expansion area. A total of 8 species, consisting of 55 individual birds, were recorded (Tables G15/16, Appendix G). Black-capped Chickadee (*Poecile atricapillus*), Golden-crowned Kinglet (*Regulus satrapa*), and Blue Jay (*Cyanocitta cristata*), all resident species, were the most abundant and frequently observed species.

Overall, there were 3.92 ± 1.57 (mean ± 95% confidence interval) individual birds and 1.78 ± 0.55 species observed per survey location during winter surveys at the Project site.

2013 Winter Bird Survey – Original 2013 Control Site

Winter surveys at the Control site were limited to a single stopover count along the Ellershouse Road, to the north of the Project site, on December 7, 2013 (Drawing 8.8).

Four species were observed at the Control site location, including American Goldfinch (*Spinus tristis*), Blue Jay, Golden-crowned Kinglet, and Purple Finch (*Carpodacus purpureus*) (Table G17, Appendix G).

Post-Construction Avifauna Mortality Monitoring (2016)

A post-construction avifauna mortality monitoring program began at the first phase of the Ellershouse Wind Farm site in the spring of 2016. The four phase-1 turbines (WTG 2, 3, 4 and 5) were monitored using human searchers for 4 weeks during the spring migration period from mid-May until Mid-June, and then for 8 weeks during the fall migration period from late August until mid-October 2016. Searcher efficiency trials, to assess the ability of the searcher to find bird carcasses, as well as scavenger removal trials, to assess the rate at which scavengers remove carcases from the Project site, were also conducted as part of the monitoring program.

No bird or bat carcasses were found by the searcher in 2016. The searcher was 60% effective at finding planted bird carcasses, and the scavenger removal rate was low at 15% of planted carcasses being removed.

The results of the first year of mortality monitoring at the Ellershouse wind farm indicate that turbines operating in the general area of the Project site do not cause significant rates of bird mortality. Mortality monitoring will continue into 2017 at the Ellershouse Wind Farm, and will also include WTGs 1, 6 and 7, which will go into operation in early 2017. Mortality monitoring at the proposed Ellershouse Expansion Site would begin once the turbines are operational, should the Project receive EA approval.

Bird Survey Summary

The Project site is situated along a prominent ridge the guards the mouth of the Avon River estuary, and resides in a landscape dominated by softwood and mixed wood stands, interspersed with cutovers and freshwater lakes. The bird community in the general Project area reflects both the habitat character and geographic location.

The arrival of spring migrants in 2013 at the Project area occurred in pulses consistent with patterns observed throughout the region. Both overall abundance and diversity increase as the spring migration period progresses. Early migrants such as American Robin, Hermit Thrush, and White-throated Sparrow are present in reasonable numbers in late April, while the initial pulse of migrant warblers such as Black-throated Green Warbler, Palm Warbler, and Yellow-rumped Warbler reaches the site by early May. At the culmination of the main passerine migration period, at which time it may be inferred that the process of breeding territory establishment is well under way, the dominant feature of the spring migrant community is warblers associated with mid-aged to mature forest habitats, such as Black-and-White Warbler, Black-throated Blue Warbler (*Dendroica caerulescens*), Ovenbird (*Seiurus aurocapilla*), and Black-throated Green Warbler, or those adaptable to varying successional forest stage and/or disturbance including Magnolia Warbler (*Dendroica magnolia*) and Common Yellowthroat (*Geothlypis trichas*). The absence of Palm Warbler and the low numbers of Yellow-rumped Warbler and Chestnut-sided Warbler (*Dendroica pensylvanica*) in late May are notable due to the prevalence of apparently suitable edge/regenerating cutover habitat at the Project site.

No waterfowl/waterbirds were observed during spring migration surveys, although it is likely that individuals move between a series of freshwater lakes on the landscape. Nonetheless, observations do not suggest that the Project site is situated within an important migratory corridor for these species.

A comparison of 2013 Project site and Control site (which largely overlaps with the proposed 2016 expansion area) data suggests strongly that the spring migrant bird community at the Project site is similar in numbers, overall diversity, and composition to that of the surrounding area.

The Project site supports a relatively diverse breeding bird community. As in the spring migration surveys, the dominant species during the breeding season were birds associated with forest or edge habitats. While overall these species were present in reasonable numbers, the relatively large area

surveyed does not suggest that breeding densities at the site are particularly high. Ovenbird, for instance, was the most abundant species during the final breeding season survey with 14 individuals observed. Given that species' 200 m detection radius (BAMP 2013a) was survey at eight locations, a 100 ha effective survey area for Ovenbird was employed within the Project site. This results in a calculated density of 0.139 birds/ha, below the 0.391 birds/ha density estimate for the species in Nova Scotia (BAMP 2013a). While similar calculations were not undertaken for other breeding species, this result is representative of the overall pattern.

Over 83% of those species observed during late spring migration surveys were also observed at some point during the breeding season, which suggests that the majority of species using the Project site as stop-over habitat during migration remain to establish breeding territories. Noticeably absent from the Project site's breeding community were most boreal species, including as Gray Jay, Boreal Chickadee, Spruce Grouse (*Falcipennis canadensis*), and Black-backed Woodpecker-, although the latter species is more common along Nova Scotia's Eastern Shore. These absences are likely due to the general lack of black spruce/balsam fir dominated wetlands at the Project site. This pattern is also evidenced by the rather low numbers of breeding Golden-crowned Kinglets at the site. Waterfowl and waterbirds were also absent from the breeding community, due mainly to the lack of open water features at the Project site.

The presence of Pileated Woodpecker suggests that trees of adequate size are present in intact forest stands to support a diverse cavity, if not abundant, nesting community. Indeed, six species of cavity nesting birds were observed at the 2013 Project site. Given that Barred Owl was also recorded during the passerine spring migration season, it is likely that this species also breeds at the site in late winter.

A comparison of 2013 Project site and Control site (which largely overlaps with the proposed 2016 expansion area) data suggests strongly that the breeding bird community at the Project site is similar in numbers, overall diversity, and composition to that of the surrounding area.

Given their transient nature and less rigid habitat affinities, it can be difficult to draw meaningful conclusions about a site's ability to attract migrant passerines in the fall. As is typical of primarily forested habitats, the fall bird community at the Project site in September 2013 was typified by mixed flocks of migrants travelling with Black-capped Chickadees. Common species within these flocks at this time included Black-throated Green Warbler, Black-and-white Warbler, Magnolia Warbler, Rey-eyed Vireo and Northern Parula (*Parula americana*), among others, the largest of such mixed flocks numbering 23 individuals. As the fall migration period progressed, an influx of Golden-crowned Kinglets coincided with the departure of most migrants, such that Black-capped Chickadees and Golden-crowned Kinglets accounted for over half of all birds observed at the site during October and November. Nomadic finches were only represented by small numbers of Purple Finch (*Carpodacus purpureus*) and American Goldfinch (*Spinus tristis*) during the entirety of the fall migration period, although it remains to be seen if broad movements of other cone/seed specialists will encompass the Project site during the winter months. Migrant sparrows accounted for just 3% of all birds observed during the fall migration period, despite surveys during the traditional peak of sparrow migration in October. It is likely that migrant sparrows actually account for a lower proportion of the

fall bird community than is indicated by the survey results, since Dark-eyed Juncos will often over-winter in Nova Scotia, particularly if supplemental food sources (*i.e.*, feeders) are available.

While mixed flocks were numerous at the Project site, particularly during the peak of warbler migration, features that may attract large number of migrants (*i.e.*, clusters of fruit bearing trees/shrubs, open water wetlands, etc) were not observed. It is therefore unlikely that the Project site is located within an important flyway for fall migrants.

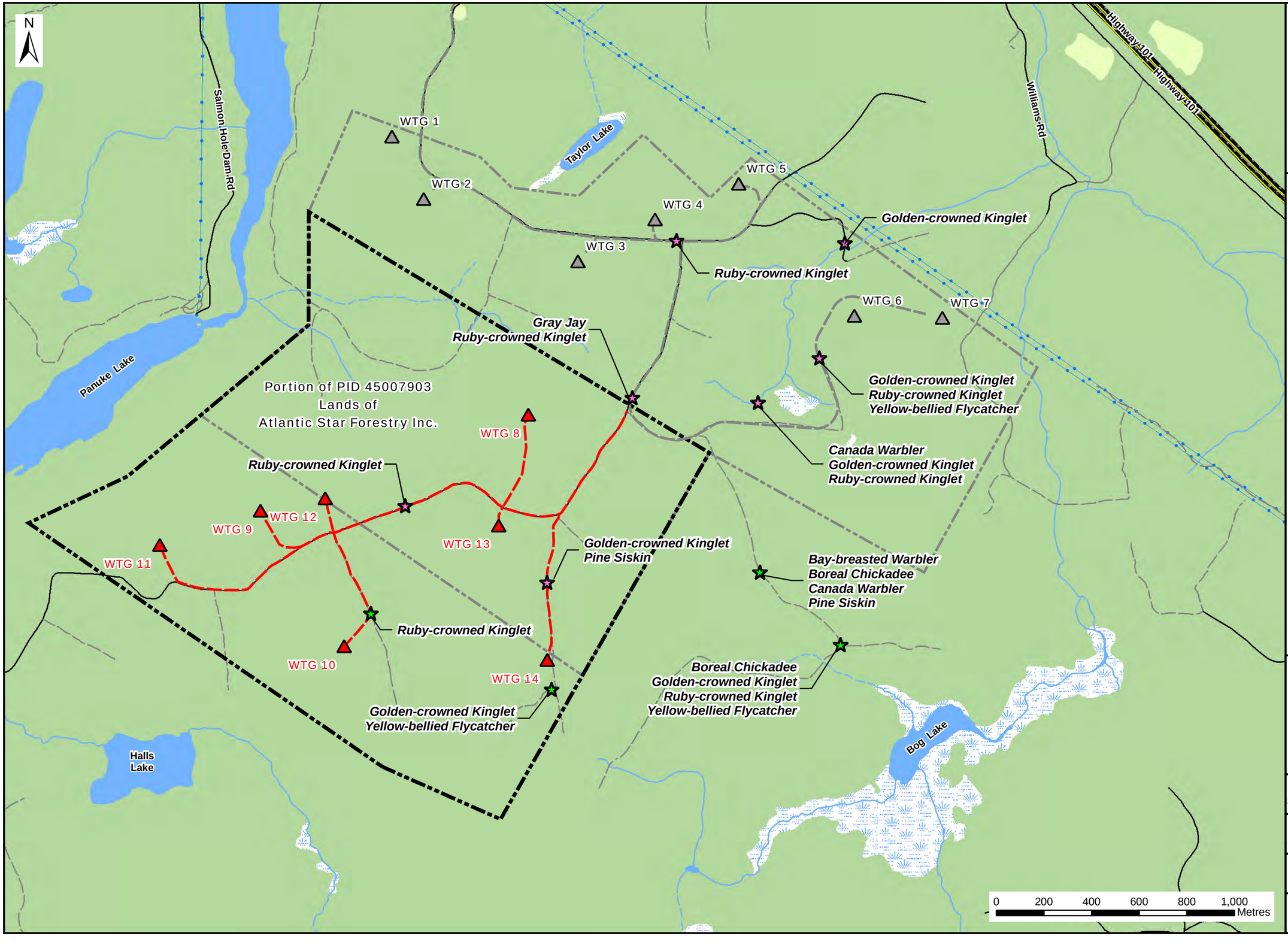
In comparing the 2013 fall migration survey data on the Project site to the 2016 fall migration survey data collected on the expansion site, the average number of individual birds observed per stopover survey location was comparable (5.69 ± 1.50 in 2013 vs. 6.95 ± 2.28 in 2016). There was notably less diversity in the species observed in 2016 than in 2013 (43 species observed in 2013 vs. 23 species observed in 2016). This is likely due to differences year over year differences in bird migration patterns.

Results from surveys completed in early winter 2013 do not suggest that the Project site supports a particularly robust winter bird community, although reasonable numbers of Black-capped Chickadees and Golden-crowned Kinglets were observed. No winter visitor species were observed, and nomadic finches were limited to small numbers of American Goldfinch and Purple Finch. Although it is impossible to predict the density of the expected winter bird community as the season progresses, particularly for nomadic species whose distribution is influenced by cone crops in other regions, the Project site nonetheless would appear to offer attractive features for over-wintering birds. Steep slopes create valleys which likely afford shelter from harsh winter conditions, so it is possible that over-wintering passerines may congregate at these locations when the weather deteriorates.

Overall, there were 60 different species identified at or near the Project site during surveys conducted during the spring, breeding, and fall seasons, including 10 priority species (Table 8.10, Drawings 8.9A-D).

Table 8.10: Bird SOCI identified at the Project Site

Common Name	Scientific Name	SARA Status	NSESA Status	COSEWIC Status	NSDNR Status	Survey(s) Observed
Bay-breasted Warbler	*Dendroica castanea*	Not Listed	Not Listed	Not Listed	Sensitive	Fall 2013
Boreal Chickadee	*Poecile hudsonicus*	Not Listed	Not Listed	Not Listed	Sensitive	Fall 2013
Canada Warbler	*Wilsonia canadensis*	Threatened	Endangered	Threatened	At Risk	Spring 2013, Breeding2013
Eastern Wood-pewee	*Contopus virens*	No Status	Vulnerable	Special Concern	Sensitive	Fall 2013
Golden-crowned Kinglet	*Regulus satrapa*	Not Listed	Not Listed	Not Listed	Sensitive	Spring 2013, Breeding 2013, Fall 2013 and



Notes:

1. Reference: Digital Topographic Mapping & Property Management Unit MU9940 by Nova Scotia Geomatics Centre.
2. Projection: NAD83(CSRS), UTM Zone 20 North.
3. Site Features & Project / Propety Boundaries are Approximate. This Plan is for Presentation only & Not Intended for Legal Use
4. GPS Data Collected is Typically to +/-5m Accuracy.

Legend:

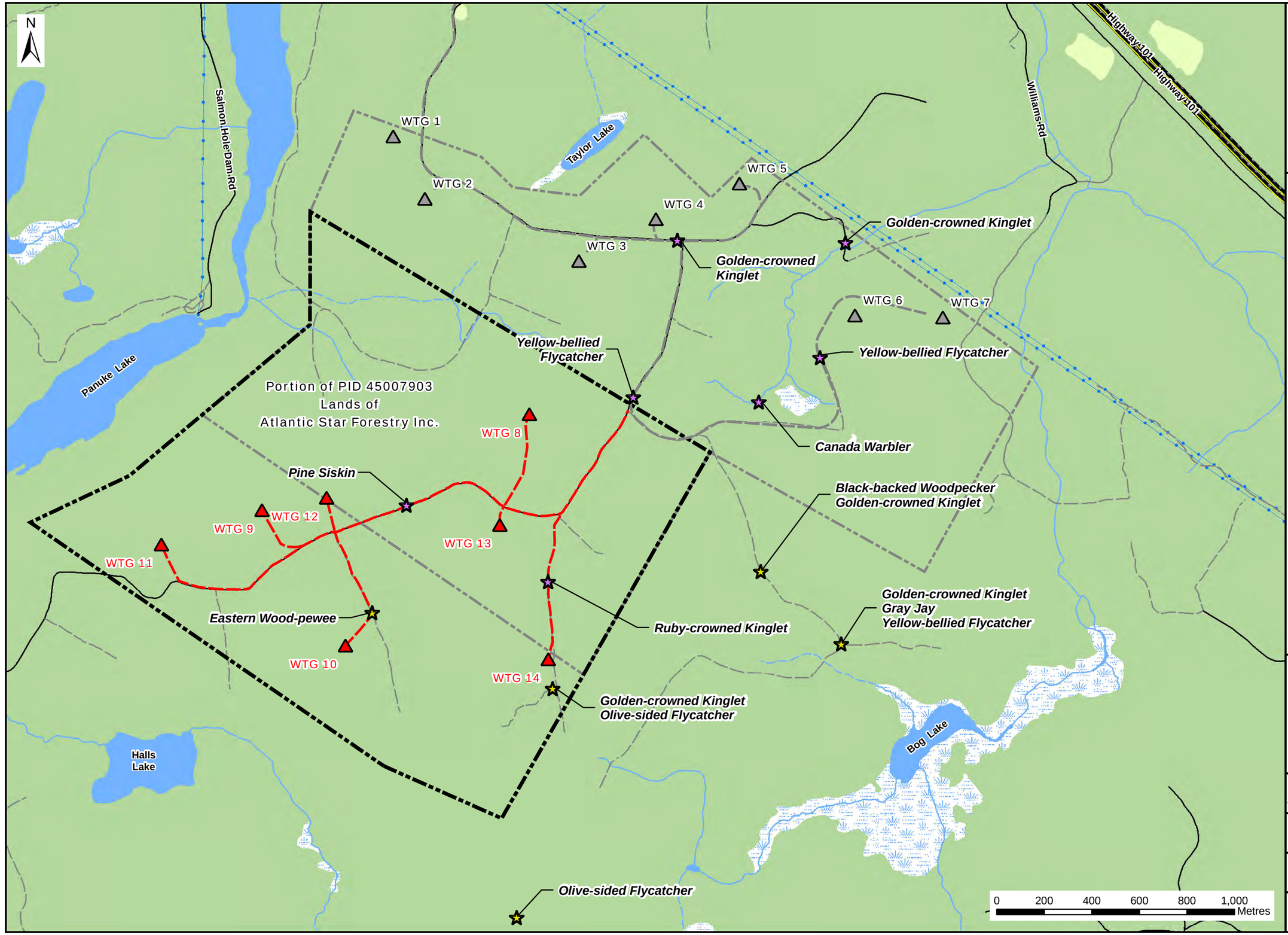
- Existing Turbines
- Proposed Turbines
- Existing Access Road
- Proposed Access Road
- *Spring Migration Priority Species Locations (Control Site)*
- *Spring Migration Priority Species Locations (Project Site)*
- Former Project Site Boundary
- Expansion Project Site
- Major Roads and Highways
- Public Roads
- Access Roads / Trails
- Mapped Stream
- Mapped Indefinite Stream
- Water Bodies
- Mapped Wet Area
- Cleared Area

Ellershouse Wind Farm Expansion - Spring Migration Priority Species Locations

Strum 20 YEARS Taking Charge CONSULTING

*Engineering * Surveying * Environmental*
*Bedford * Antigonish * Moncton * Deer Lake*

Date: September 2016	Project #: 16-5807
Scale: 1:15,000	Drawing #: **8.9A**
Drawn By: H. Serhan	
Checked By: S. Duncan	



Notes:

1. Reference: Digital Topographic Mapping & Property Management Unit MU9940 by Nova Scotia Geomatics Centre.
2. Projection: NAD83(CSRS), UTM Zone 20 North.
3. Site Features & Project / Propety Boundaries are Approximate. This Plan is for Presentation only & Not Intended for Legal Use
4. GPS Data Collected is Typically to +/-5m Accuracy.

Legend:

- *Breeding Priority Species Locations (Control Site)*
- *Breeding Priority Species Locations (Project Site)*
- Existing Turbines
- Proposed Turbines
- Existing Access Road
- Proposed Access Road
- Expansion Project Site
- Former Project Site Boundary
- Major Roads and Highways
- Public Roads
- Access Roads / Trails
- Mapped Stream
- Mapped Indefinite Stream
- Water Bodies
- Mapped Wet Area
- Cleared Area

Ellershouse Wind Farm Expansion - Breeding Priority Species Locations

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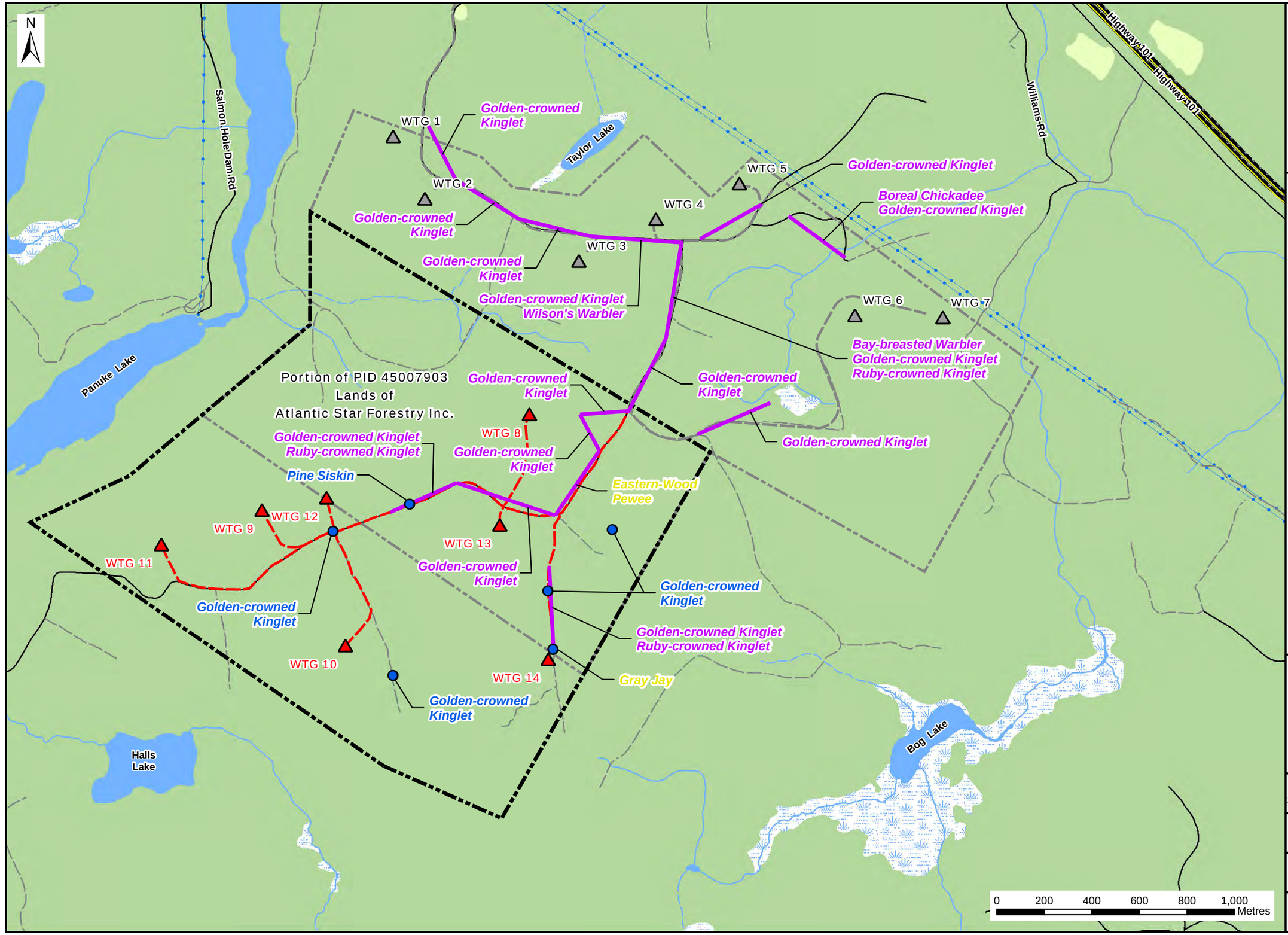
Date: September 2016	Project #: 16-5807
Scale: 1:15,000	Drawing #: **8.9B**
Drawn By: H. Serhan	
Checked By: S. Duncan	



Notes:

1. Reference: Digital Topographic Mapping & Property Management Unit MU9940 by Nova Scotia Geomatics Centre.
2. Projection: NAD83(CSRS), UTM Zone 20 North.
3. Site Features & Project / Propety Boundaries are Approximate. This Plan is for Presentation only & Not Intended for Legal Use
4. GPS Data Collected is Typically to +/-5m Accuracy.

Legend:

- Existing Turbines
- Proposed Turbines
- *2016 Fall Migration Priority Species Locations*
- *2013 Fall Migration Priority Species Locations*
- Existing Access Road
- Proposed Access Road
- Expansion Project Site
- Former Project Site Boundary
- Major Roads and Highways
- Public Roads
- Access Roads / Trails
- Mapped Stream
- Mapped Indefinite Stream
- Water Bodies
- Mapped Wet Area
- Cleared Area

Ellershouse Wind Farm Expansion - Breeding Priority Species Locations

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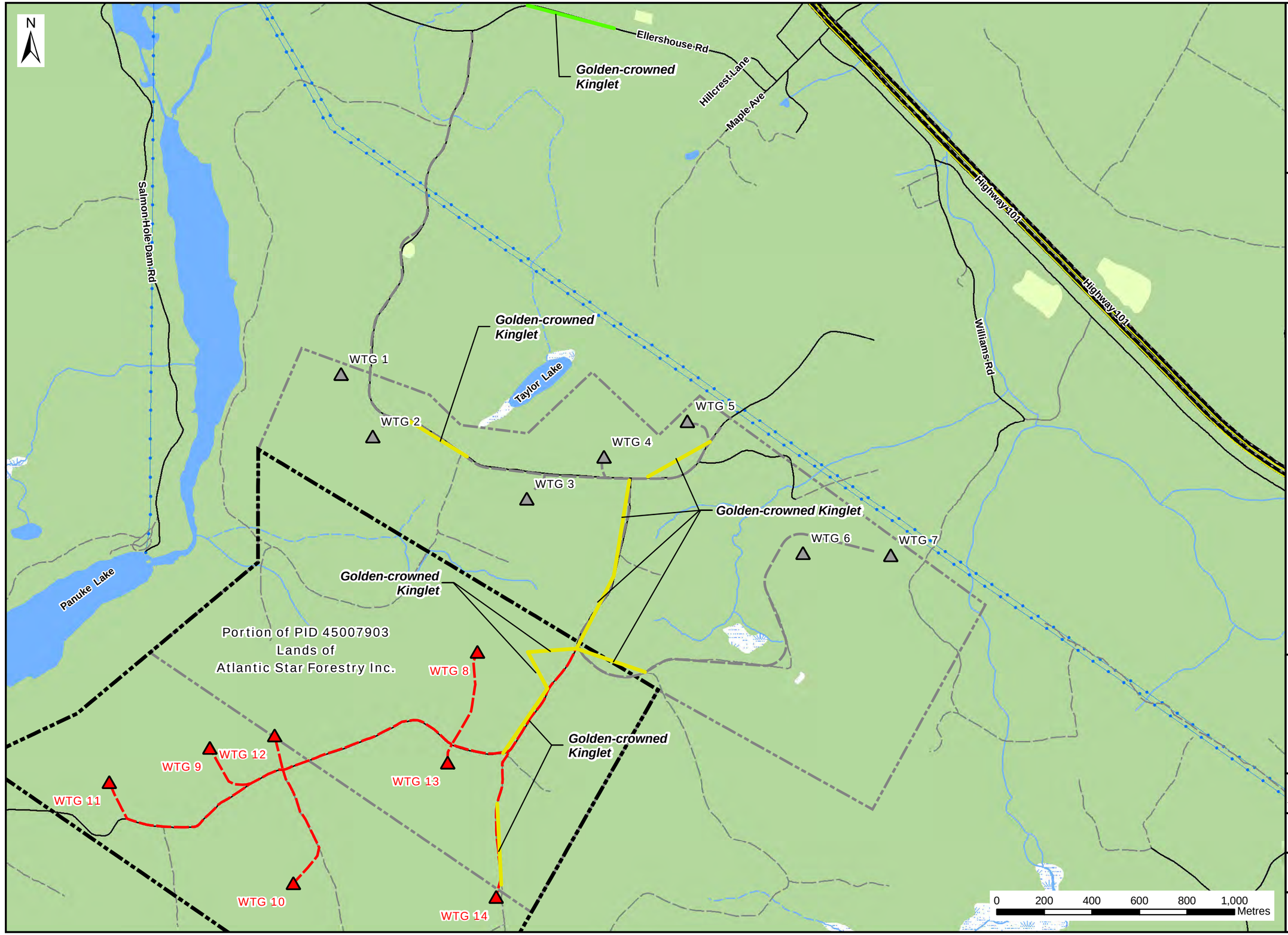
Date: September 2016	Project #: 16-5807
Scale: 1:15,000	Drawing #: **8.9C**
Drawn By: H. Serhan	
Checked By: S. Duncan	



Notes:

1. Reference: Digital Topographic Mapping & Property Management Unit MU9940 by Nova Scotia Geomatics Centre.
2. Projection: NAD83(CSRS), UTM Zone 20 North.
3. Site Features & Project / Propety Boundaries are Approximate. This Plan is for Presentation only & Not Intended for Legal Use
4. GPS Data Collected is Typically to +/-5m Accuracy.

Legend:

- Existing Turbines
- Proposed Turbines
- *Winter Priority Species Locations (Control Site)*
- *Winter Priority Species Locations (Project Site)*
- Existing Access Road
- Proposed Access Road
- Expansion Project Site
- Former Project Site Boundary
- Major Roads and Highways
- Public Roads
- Access Roads / Trails
- Mapped Stream
- Mapped Indefinite Stream
- Water Bodies
- Mapped Wet Area
- Cleared Area

Ellershouse Wind Farm Expansion - Breeding Priority Species Locations

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Date: September 2016	Project #: 16-5807
Scale: 1:15,000	Drawing #: **8.9D**
Drawn By: H. Serhan	
Checked By: S. Duncan	

Common Name	Scientific Name	SARA Status	NSESA Status	COSEWIC Status	NSDNR Status	Survey(s) Observed
						2016, Winter 2016
Gray Jay	*Perisoreus canadensis*	Not Listed	Not Listed	Not Listed	Sensitive	Spring 2013, Fall 2016
Pine Siskin	*Spinus pinus*	Not Listed	Not Listed	Not Listed	Sensitive	Spring 2013, Breeding2013 Fall 2016
Ruby-crowned Kinglet	*Regulus calendula*	Not Listed	Not Listed	Not Listed	Sensitive	Spring 2013, Breeding 2013, Fall 2013
Wilson's Warbler	*Wilsonia pusilla*	Not Listed	Not Listed	Not Listed	Sensitive	Fall 2013
Yellow-bellied Flycatcher	*Empidonax flaviventris*	Not Listed	Not Listed	Not Listed	Sensitive	Spring 2013, Breeding 2013

[1]Government of Canada 2015; [2]NS *ESA* 2015; [3]COSEWIC 2015; [4]NSDNR 2015

Of the priority species listed in Table 8.13, the following two species are listed under either *SARA* or NS *ESA*:

- Canada Warbler; and
- Eastern Wood-Pewee

The likelihood of these species to be impacted by the Project is evaluated below.

Canada Warbler

The Canada Warbler uses a wide range of forest types that have a well-developed shrub layer and a structurally-complex forest floor (COSEWIC 2008). In Nova Scotia, highest breeding densities are achieved in poorly drained areas such as treed and shrub swamps (BAMP 2013b). Wetland habitats are infrequent on the Project site and are scarce in proximity to proposed infrastructure (Section 8.4.1; Drawing 8.4A-D, Appendix D).

Canada Warbler was observed twice at the same location during the 2013 surveys, within early successional mixed wood near a watercourse, during late spring migration and during breeding season surveys (Drawing 8.9B). The breeding season for Canada Warbler is rather restricted, and extends from the second week of June to the second week of July. It's possible that the late-May observation represented an individual arriving on territory, and that the subsequent observation at this location was the same individual. That singing persisted into late June may indicate that this individual was an un-mated male. Indeed, the species is considered just a "Possible" breeder at the Project site due to the absence of stronger breeding evidence.

Canada Warbler was also observed at a Control site location in 2013 to the south of the original 2013 Project site, and to the west of the proposed 2016 expansion area (Drawing 8.9A) during late spring migration surveys, which may suggest the establishment of a breeding territory in this area.

Based on the distance (>750 m) between Canada Warbler observations and the turbine locations proposed originally, the maintenance of a buffer around all field-identified wetlands, and the apparent availability of suitable habitat in the surrounding landscape, it is unlikely that Project activities will adversely affect the Canada Warbler.

Eastern Wood-Pewee

The Eastern Wood-Pewee is a forest insectivore exhibiting a wide range of habitat use, but generally found in deciduous forests in areas of lower canopy cover (*e.g.*, near forest clearings and edges) (McCarty 1996). On the Project site, mature deciduous and mixed wood stands are prevalent and commercial forestry operations have resulted in an abundance of edges and adjacent patches of regenerating vegetation at varying successional stages.

One male Eastern Wood-Pewee was detected at the original Project site in 2013 during the fall migration period, perched atop a young balsam fir adjacent to a recent cutover (Drawing 8.9C). The individual was likely using edge habitat at the Project site as a stopover. This species was also observed at a Control site location to the south of the Project site, indicating that viable habitat is available in nearby areas. Given the current prevalence of forest/cutover edge habitat at the Project site and in the surrounding landscape, it is unlikely that the Project will negatively impact the Eastern Wood-Pewee.

The requirements as set out in the *MBCA* will be adhered to for Project activities. Additional general mitigation measures for Project-related effects to avifauna are provided in Section 4.0. Additional mitigation for avifauna is provided in Section 13.

8.8 Bats

The Nova Scotia Significant Species and Habitats database (NSDNR 2016) indicates twenty-three features related to bats and/or bat habitats within a 100 km radius of the Project site. All are classified in the database as “Species at Risk”, and relate to Little Brown Myotis (Myotis lucifugus) (10) or bat hibernacula (13). The database identifies one records relating to bats within a 10 km radius of the Project site. This is Frenchman’s Caves bat hibernaculum, located approximately 5.5 km to the north.

Moseley (2007) provided an overview of the known bat hibernacula in the caves and mines of Nova Scotia. This research indicates 14 known hibernacula within a 100 km radius of the Project site (Table 8.11).

Table 8.11: Known Bat Hibernacula within 100 km of the Project site

Hibernaculum	Approximate Distance to Project Site (km)	Direction
Frenchman's Cave	5.8	N
Miller’s Creek Cave	8.4	N
Woodville Ice Cave	13.4	NNE
Centre Rawdon Gold Mine	20.7	NE
Cheverie Cave	28.9	NNW
Walton Barite Mine	33.5	N

Hibernaculum	Approximate Distance to Project Site (km)	Direction
Peddlar's Tunnel	38.4	NNW
Minasville Ice Cave	43.8	NNE
Cave of the Bats	53.4	NE
Hayes Cave	53.4	NE
Gayes River Gold Mine	55.9	ENE
Black Brook Cave	58.7	E
Lear Shaft	68.7	NE
The Ovens	69.0	S
Vault Cave	79.2	W
Lake Charlotte Gold Mine	83.5	E

Source: Moseley (2007)

Frenchman's Cave, the closest known hibernaculum, is considered a small hibernacula which supports 10 – 50 over-wintering bats, although all three of the hibernating species have been recorded at this site (Moseley 2007).

The closest hibernaculum considered to be of significance is Centre Rawdon Gold Mine, situated Cheverie Cave, situated approximately 20 km to the northeast. This abandoned mine is thought to have historically supported over 650 bats (Moseley 2007).

The largest known hibernaculum in Nova Scotia is Hayes Cave, located in South Maitland approximately 53 km to the northeast (Moseley 2007). Up to 6,000 bats enter this cave in September and reside until June (Davis and Browne 1996), although preliminary results from 2012 suggest that White-nose syndrome has reduced the hibernating population to approximately 250 individuals (M. Elderkin, personal communication).

Table 8.15 presents bat species recorded within a 100 km radius of the Project site, according to ACCDC.

Table 8.12 Bat Species Recorded within a 100 km radius of the Project Site

Common Name	Scientific Name	*SARA* Status[1]	NS *ESA* Status[2]	COSEWIC Status[3]	NSDNR Status[4]	NS S-Rank[5]
Little brown myotis	*Myotis lucifugus*	Endangered	Endangered	Endangered	At Risk	S1
Northern long-eared myotis	*Myotis septentrionalis*	Endangered	Endangered	Endangered	At Risk	S1
Tri-colored bat	*Perimyotis subflavus*	Endangered	Endangered	Endangered	At Risk	S1

Source: ACCDC 2016

[1]Government of Canada 2012; [2]NS *ESA* 2013; [3]COSEWIC 2012; [4]NSDNR 2010; [5]ACCDC 2016

The Northern long-eared myotis, Little-brown myotis, and Tri-colored bat were added to the NS *ESA* list and declared endangered on July 11, 2013. A 90% population decline over the past two years has been attributed to a disease called white-nose syndrome, cause by the fungus *Geomyces destructans* (NS *ESA* 2013). The disease has killed nearly 7 million bats in eastern North America in

the past 8 years. White-nose syndrome is lethal and affects all bat species that congregate in caves and abandoned mines used for hibernation through the winter (NS *ESA* 2013).

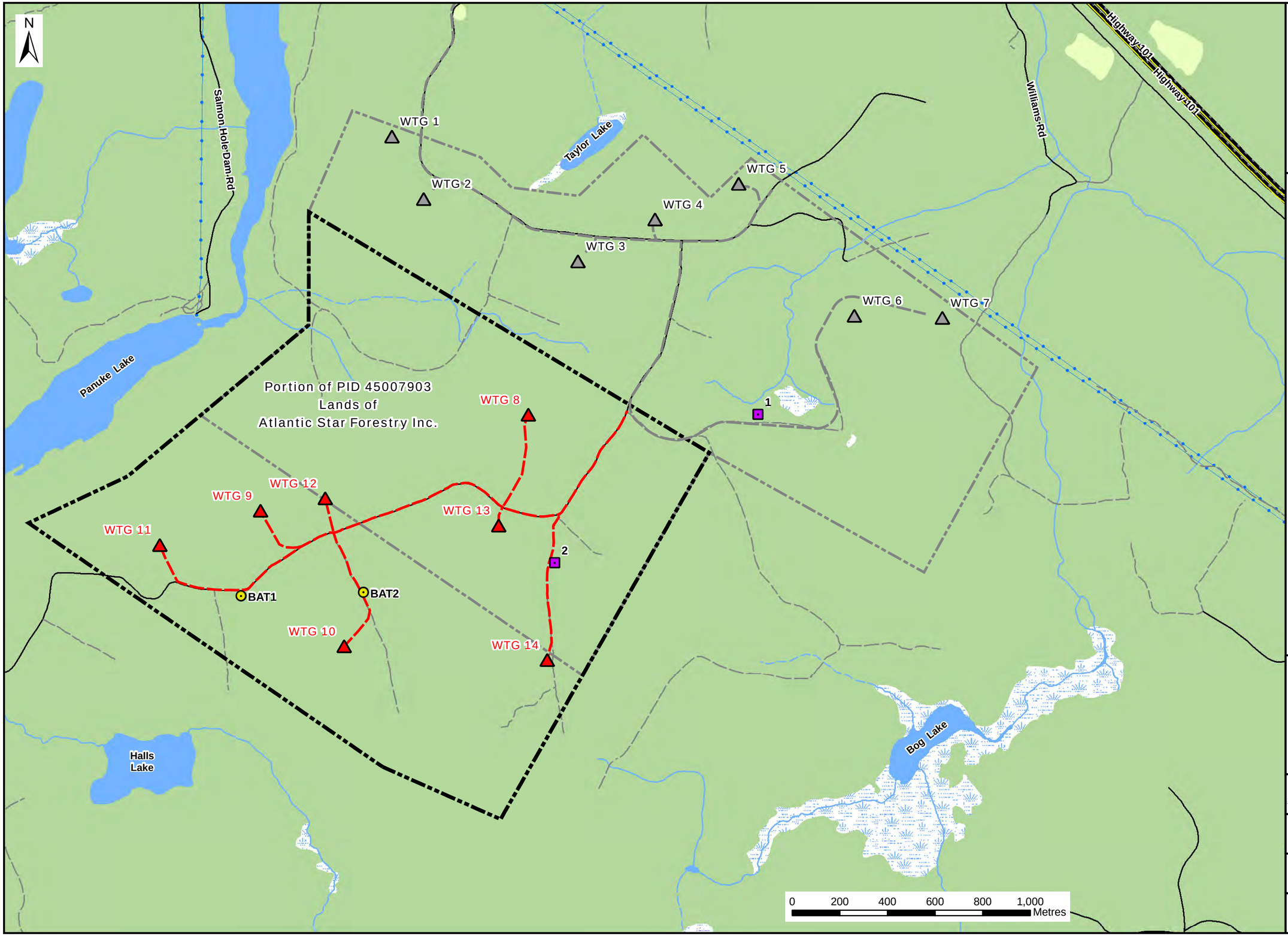
Field surveys of bat migration/habitat use were carried out for 31 consecutive days from August 23 to September 23, 2016 using two AnaBat SD2 Detectors (Titley Electronics, Columbia, Missouri). Bat detectors were located in habitats representative of the Project site and that are expected to provide suitable foraging habitat for bats (*i.e.,* edges and wetlands). Detector 1 was deployed in an open shrub swamp, on the Project site, approximately 362 m southeast from the closest turbine (Turbine 11). Detector 2 was deployed on the boundary of a clear-cut and a mid-aged hardwood stand approximately 209 m northeast of Turbine 10 (Drawing 8.10).

In total, 1184 files were recorded by the Anabat detectors, of which only 22 were determined to be bat generated ultrasound. The remaining files were determined to be caused by extraneous noise.

Detector 1 recorded all 22 bat calls, while Detector 2 did not record any calls. All 22 of the echolocation calls recorded at Detector 1 were associated with Myotis species bats (*i.e.*, Little brown myotis (*Myotis lucifugus*) and Northern long-eared myotis (*Myotis septentrionalis).* Due to their similarity, calls of Nova Scotia's two resident Myotis species (Little brown myotis and Northern long-eared myotis) can be difficult to reliably distinguish from one another (O'Farrell et al. 1999), so these calls were not identified to species (Table 8.13).

Table 8.13: Number of Echolocation Calls Recorded at the Project Site (Aug 26 – Sept 23, 2016)

Date	Detector 1	Detector 2
	Myotis Sp.	Myotis Sp.
23-Aug-16	1	0
24-Aug-16	3	0
25-Aug-16	2	0
26-Aug-16	2	0
27-Aug-16	0	0
28-Aug-16	0	0
29-Aug-16	1	0
30-Aug-16	0	0
31-Aug-16	1	0
01-Sep-16	5	0
02-Sep-16	1	0
03-Sep-16	0	0
04-Sep-16	0	0
05-Sep-16	0	0
06-Sep-16	0	0
07-Sep-16	0	0
08-Sep-16	0	0
09-Sep-16	0	0
10-Sep-16	0	0



Notes:

1. Reference: Digital Topographic Mapping & Property Management Unit MU9940 by Nova Scotia Geomatics Centre.
2. Projection: NAD83(CSRS), UTM Zone 20 North.
3. Site Features & Project / Propety Boundaries are Approximate. This Plan is for Presentation only & Not Intended for Legal Use
4. GPS Data Collected is Typically to +/-5m Accuracy.

Legend:

- 2016 Bat Detector Locations
- 2013 Bat Detector Locations
- Existing Turbines
- Proposed Turbines
- Existing Access Road
- Proposed Access Road
- Expansion Project Site
- Former Project Site Boundary
- Major Roads and Highways
- Public Roads
- Access Roads / Trails
- Existing Transmission Lines
- Mapped Stream
- Mapped Indefinite Stream
- Water Bodies
- Mapped Wet Area
- Cleared Area

Ellershouse Wind Farm Expansion - Bat Monitoring Locations

Strum Consulting — 20 Years Taking Charge

*Engineering * Surveying * Environmental*
*Bedford * Antigonish * Moncton * Deer Lake*

Date: September 2016	Project #: 16-5807
Scale: 1:15,000	Drawing #: **8.10**
Drawn By: H. Serhan	
Checked By: S. Duncan	

Date	Detector 1	Detector 2
	Myotis Sp.	Myotis Sp.
11-Sep-16	0	0
12-Sep-16	1	0
13-Sep-16	3	0
14-Sep-16	1	0
15-Sep-16	0	0
16-Sep-16	0	0
17-Sep-16	0	0
18-Sep-16	0	0
19-Sep-16	0	0
20-Sep-16	0	0
21-Sep-16	0	0
22-Sep-16	0	0
23-Sep-16	1	0
Total	**22**	**0**

Calls persisted throughout the monitoring period, but there were significantly less myotis calls after the beginning of September. It is possible that the absence of calls after early to mid-September can be explained by the fact that most bats had completed their migration through the area to their respective hibernacula. Alternatively, insect prey availability may have diminished in the area, causing bats to forage in more productive habitats (*i.e.*, over open water). The low number of bat calls detected throughout the sampling period indicates that bat activity on the site appears to be low.

A bat assessment was also done in 2013 as part of the 2013 EA for the original Ellershouse Wind Farm. In 2013, monitoring persisted for 38 consecutive days from August 26 to October 3 at two locations on the original Ellershouse Wind Farm Project site. Between the two monitors, 20 Myotis calls were detected, and one Tri-colored bat (*Perimyotis subflavus*). Much like what was observed in 2016, the majority of the bat calls detected in 2013 were in late August / early September. These results indicate that bat activity in the general area of the Project site is similar between 2013 and 2016.

No bat mortalities were observed during the first season of post-construction avifauna mortality monitoring at phase 1 of the Ellershouse Wind Farm, indicating that there is a low propensity for operating wind turbines in the area to cause bat mortalities.

Bat species that were identified during field surveys or that have been recorded within a 100 km radius of the Project site were screened against the criteria outlined in the document “Guide to Addressing Wildlife Species and Habitat in an EA Registration Document” (NSE 2009) to develop a list of priority species. These priority species include:

- Little brown myotis – “Endangered” (SARA), “Endangered” (NS *ESA*), “Endangered” (COSEWIC), “At Risk” (NSDNR), “S1” (ACCDC);

- Northern long-eared myotis – "Endangered" (SARA), "Endangered" (NS *ESA*), "Endangered" (COSEWIC), "At Risk" (NSDNR), "S1" (ACCDC); and
- Tri-colored bat (or Eastern pipistrelle) – "Endangered" (SARA), "Endangered" (NS *ESA*), "Endangered" (COSEWIC), "At Risk" (NSDNR), "S1" (ACCDC).

The Little brown myotis is the most common species in Nova Scotia, and is probably ubiquitous in the province (Broders *et al*. 2003). During the day, the Little brown myotis will roost in buildings, trees, under rocks, in wood piles, and in caves, congregating in tight spaces to roost at night (Fenton and Barclay 1980). As a non-migratory species, Little brown myotis hibernates from September to early or mid-May in abandoned mines or caves (Fenton and Barclay 1980; Mosely 2007).

ACCDC data indicates that the closest Little brown myotis sighting to the Project site was 5.3 km away at Frenchmans' Cave. It is highly likely that some of the echolocation calls recorded during field studies were emitted by Little brown myotis.

The Northern long-eared myotis, although once considered uncommon throughout Nova Scotia (Moseley 2007), is likely ubiquitous in the forested regions of the province (Broders *et al*. 2003). This species is widely distributed in the eastern United States and Canada, and is commonly encountered during swarming and hibernation (Caceres and Barclay 2000). During the day, Northern long-eared myotis show a preference for roosting in trees, the characteristics of which have been shown to vary according to the reproductive status of bred females (Garroway and Broders 2008). Females appear to prefer shade tolerant deciduous trees over coniferous trees, whereas males roost alone in coniferous or mixed-stands in mid-decay stages (Broders and Forbes 2004). Northern long-eared myotis are also non-migratory and are typically associated with the Little brown myotis during hibernation, in caves or abandoned mines (Moseley 2007). Hibernation in this species is thought to begin as early as September and can last until May (as cited in Caceres and Barclay 2000).

ACCDC data indicates that the closest Northern long-eared myotis sighting to the Project site was 5.3 km away at Frenchman's Cave. It is highly likely that some of the echolocation calls recorded during field studies were emitted by Northern long-eared myotis.

9.0 SOCIO-ECONOMIC ENVIRONMENT

9.1 Local Demographics and Industry

The Project site is located in the community of Ellershouse, within the Municipality of the District of West Hants. The largest communities in the Municipality include Windsor (pop. 3,785), Falmouth (pop. 1,213), Hantsport (pop. 1,159), and Brooklyn (pop. 970) (Statistics Canada 2012). The nearest communities to the Project site are Hartville (3.1 km), St. Croix (4.6 km), Newport Station (5.5 km) and Five Mile Plains (6.8 km).

9.1.1 Demography

Population statistics for the district of West Hants derived from the 2011 census are summarized in Table 9.1.

Table 9.1 Population in West Hants

Population Statistics	West Hants
Population in 2011	14,165
Population in 2006	13,871
Population change from 2006-2011 (%)	2.1
Total private dwellings in 2011	6,205
Land area (square km)	1,242
Population density per square kilometer	11.4

Source: Statistics Canada 2012

The age distribution in West Hants reveals a median age of 44.5 years, which is slightly higher than the provincial median age (43.7), and the HRM (39.9) (Statistics Canada 2012). An overview of age distribution for 2011 in West Hants is outlined in Table 9.2 below.

Table 9.2: Age Distribution in West Hants

Age Statistics	West Hants
0 - 14 years	2,365 (16.7%)
15 - 64 years	9,545 (67.4%)
65+ years	2,255 (15.9%)
Total Population	**14,165 (100%)**

Source: Statistics Canada 2012

In 2010, the average income for individuals in West Hants was $34,748 a year, compared with the average of $35,478 for Nova Scotia (Statistics Canada 2013). These averages are lower than the Canadian average individual income of $40,650. The average value of dwellings in the West Hants increased 32.8% between 2006 and 2010 to $193,769. In comparison, the average value of dwellings in the province increased 27.8% during the same period to $201,991 (Table 9.3).

Table 9.3: Household Costs and Average Individual Income

Jurisdictions	Average Housing Value	Average Individual Income
West Hants	$193,769	$34,748
Province of Nova Scotia	**$201,991**	**$35,478**

Source: Statistics Canada 2013

9.1.2 Health Care and Emergency Services

The Brooklyn Volunteer Fire Department is located approximately 9 km north of the Project site on Highway 215. The Windsor Fire Department is also located nearby, approximately 12 km northwest of the Project site, on King Street in the Town of Windsor.

Health services in the region are provided by the West Hants/Uniacke Community Health Authority, which offers a wide range of services throughout the Municipality of West Hants, including Hants Community Hospital, located in Windsor. Health and emergency services exist in the area and are accessible to Project workers if the need should arise.

9.1.3 Industry and Employment

Statistics for West Hants indicate that the unemployment rate in 2011 was 9.6%, which is slightly lower than the provincial average of 10% (Statistics Canada 2013). With regard to employment rates, the West Hants employment rate was 56.5%, which is slightly lower than the provincial rate of 56.8% (Statistics Canada 2013).

A breakdown of the labour force within West Hants is provided in Table 9.4. The highest proportions of workers in West Hants fall into the "construction" category (15.5%). Other significant industries include retail trade, health care and social assistance (Statistics Canada 2013).

Table 9.4: Top industries for the employed labour force, West Hants

Industry	Total West Hants
Total employed labour force 15 years +	6,655
Construction	1,030 (15.5%)
Retail trade	1,015 (15.3%)
Health Care and Social Assistance	800 (12.0%)

Source: Statistics Canada 2013

The Town of Windsor is located approximately 11 km northwest of the Project site, and offers a range of business services. A review of businesses located within 10 km of the Project site is provided in Table 9.5.

Table 9.5: Local Businesses and Proximity to Project Site

Business	Distance and direction to Project site*
Weiner Brown Alignment Centre	3.4 km northeast of the Project site, on Williams Road
Ellershouse General Store	3.5 km northeast of the Project Site, on Ellershouse Road, Ellershouse
Nothin' Fancy Furniture Warehouse Clearance Center	6.9 km northeast of the Project Site, on Hwy 215, Newport
Coyote Hill Golf Course and Driving Range	7.2 km north of the Project Site, on Hwy 215, Newport Corner
Nova International Ltd.	7.7 km northwest of the Project Site, on Highway 1, Windsor
Oulton Fuels	8.6 km northwest of the Project Site, on Highway 14, Windsor
Boulderwood Stables	8.7 km northeast of the Project Site, on Trunk 1, Ardoise
Downeast Motel	8.9 km northwest of the Project Site, on Trunk 1, Windsor
Gold House Chinese Restaurant	9.0 km northwest of the Project Site, on Trunk 1, Windsor
D&W Swinimers Convenience	9.1 km northwest of the Project Site, on Trunk 1, Windsor
Doucettes Office Solutions	9.1 km northwest of the Project Site, on Wentworth Rd, Windsor
Brooklyn Home Hardware Building Centre	9.7 km north of the Project Site, on Trunk 14, Newport
The Bread Gallery	9.8 km north of the Project Site, on Hwy 14, Brooklyn

*All distances measured from center of the Project site, using the most direct route.

A number of local artists and photographers are based out of the community of Ellershouse, including Woodland Wool, Signature Glass, David Howell's Paintings, Steve Sharpe Scenic & Landscape Photography and Transformed Life Photography.

9.1.4 Community Benefits

The Project is committed to sharing economic opportunities with the local community, throughout the development and life-span of the Project via the use of local skills and labour where possible, municipal tax revenue, and on-going energy literacy/education. The Project team has created a CLC, which will help to identify Project-related opportunities and benefits for the local community. A number of socio-economic benefits have been identified which may be expected from the Project. Economic effects as a result of the Project will include job creation and increased revenue for the Municipality of the District of West Hants.

Investment in the Local Community

It is estimated that the Project will result in approximately $10 million in investments into the province of Nova Scotia. This investment has already begun and is expected to continue in the form of contracts with Nova Scotia companies for professional services (*i.e.,* engineering, project management, legal), equipment and construction materials, road and foundation construction, tower erection, interconnection and transportation services. The Project Team is committed to providing Project-related benefits to the local community and first must better understand the community's needs. The CLC (see Section 12.1) will play a vital role in helping the development team better understand the community, its desires and expectations, as well as identifying opportunities for community involvement and related benefits.

Job Creation

Minas is a local company who understands the importance of supporting local rural communities. The Project Team is committed to using as many local skills as possible. Potential work includes environmental studies, geotechnical investigation, engineering, land and snow clearing, surveying, Project site security, road construction and maintenance, turbine component transportation, turbine foundation construction, turbine installation, collector system construction, and substation construction. Specifically, elements of job creation throughout the lifespan of the Project may include:

- Project Development- During the development phase of the Project, Nova Scotian professionals will deliver a variety of services, including: civil and electrical engineering services, legal services, environmental and biological survey services, archaeological services, land and community relations services, and many others. Dozens of professionals within Nova Scotia will render their services as part of the development of the Project.
- Construction - Though the construction phase of the Project is relatively short, it will require significant manpower for realization. Much of the construction employment will come through contracting and subcontracting of Nova Scotia construction firms. This will likely include significant elements of civil and electrical construction. It is estimated that the Project will require approximately 20–50 jobs of varying duration throughout the development and construction periods.

- Operations and Maintenance - Operational wind projects require long-term operations and maintenance professionals to be located either on-site or within short driving distance of the Project. It is generally anticipated that a team of two operations and maintenance technicians can maintain regular operations and maintenance service on approximately a dozen turbines. The jobs associated with operations and maintenance are long-term, steady, stable, and high-paying jobs

In addition to the direct investments that the Project would bring to Nova Scotia's economy, a suit of auxiliary economic benefits can also be expected. It has previously been demonstrated that investments in wind power developments can result in significant indirect ancillary benefits to local communities. Workers that are directly involved with the development would contribute to local economies by redistributing wealth to a variety of goods and services such as hotels, restaurants, and grocery stores (USDE 2008).

The Project Team is currently in the process of compiling a list of local businesses which provide skills, equipment and ancillary services, which may contribute to, and benefit from the Project throughout the various phases of its lifespan.

Tax Revenue
As outlined in the *Wind Turbine Facilities Municipal Taxation Act* (2006), the Municipality of the District of West Hants will receive tax revenues per MW on an annual basis and as such, the royalty will annually increase as the Consumer Price Index rises. The Project is expected to enhance the community's economic development by providing tax revenue of $60,000 to $100,000 annually to the Municipality.

Education
A renewable energy project in a community allows residents to gain a better understanding of wind technology and how wind power can help reduce reliance on fossil fuels. Energy literacy is an increasingly important skill in today's economy, and the Project team is committed to providing energy literacy to the communities surrounding the Project, and is available to answer questions and provide a better understanding of local and provincial energy issues. The CLC has noted that there are schools in nearby communities of Brooklyn, Newport Station and Windsor that could benefit from energy literacy programs.

9.2 Land Use and Value
The property on which the proposed wind farm is to be built is "Commercial Forest" land owned by Atlantic Star Forestry Ltd. Land use around the Project site is varied, and includes the existing Ellershouse Wind Farm to the north, Provincial Crowns lands to the south-southwest, "Resource Forest" lands to the north-northwest, and a mix of "Resource Forest", residential and farm lands to the northeast along Highway 101. The St. Croix First Nation Reserve (IR 34), which forms part of the Annapolis Valley First Nation, is located along the western boundary of the property; approximately 3.4 km from the centre of the Project site (Service NS 2013). The St. Croix Reserve was established in 1851, though it does not appear to be presently inhabited (Davis MacIntyre and Associates Ltd. 2013).

Potential effects on property values is often a concern of neighboring residents due largely to anecdotal reports from appraisers of drastic declines in property values following the nearby installation of a wind energy facility (as reviewed in Gulden 2011). Despite these concerns, a number of rigorous and statistically defensible studies have concluded that wind energy developments have had no significant effect on surrounding property values.

Prior to 2013, the most comprehensive study on the impact of wind farms on property values had been completed by Hoen *et al.* (2009). This research analyzed data on nearly 7,500 sales of single family homes situated within 10 miles (16 km) of 24 existing wind farms in the United States. Eight different hedonic pricing models failed to generate statistically significant evidence that property values for houses located within 10 miles of wind farms are influenced by the developments. Subsequent research by the same laboratory but employing further analyses confirmed these results (Hoen *et al*. 2010).

Carter (2011) analyzed home transactions in a rural landscape surrounding small (1-4 turbines) wind energy developments, while employing a hedonic model to statistically control for variables affecting all real estate transactions such as square footage, age of home, and school zone. This study concluded that proximity to the wind farms did not impact average selling price of homes; in fact, in one case, homes closer to a wind farm sold for significantly higher than those elsewhere (Carter 2011).

A study by Hinman (2010) tracked property transactions in communities located close to a 240-turbine wind farm for an eight year period that spanned pre-development and operation stages. Hinman (2010) found that before project approval, property values in the area decreased. This was attributed to a fear of the unknown effects that the development would have; an effect known as anticipation stigma. However, once the development became operational, property values recovered. This recovery was attributed to a greater understanding of the operational effects of the development. Anticipation stigma, however, was not detected in a similar study in Colorado (Laposa and Mueller 2010), in which it was concluded that the announcement of a large wind energy development did not significantly reduce the selling prices of homes surrounding the proposed development.

Until very recently, the primary limitation of previous research on the effects of wind energy facilities on surrounding home values has been that research has been based on relatively small sample sizes (data sets) of relevant home-sale data. The inability to account for the complexity of the various factors which affect property values has also been cited as a limitation to previous studies. In particular, data had been limited for homes located within about a half mile (800 m) of turbines, where impacts would be expected to be the largest: Hinman (2010) (n~11); Carter (2011) (n~41). This is in part due to the fact that setback requirements generally result in wind facilities being sited in areas with relatively few houses, limiting the number of sales transactions available to be analyzed (Hoen *et al.* 2013). Although these smaller datasets are adequate to examine large impacts (*e.g.*, over 10%), they are less likely to reveal small effects with any reasonable degree of statistical significance.

A recent study published in August 2013 by Berkeley National Laboratory (principal authors) was conducted to address these gaps in data, and included the largest home-sale data set to date. Researchers collected data from 51,276 home sales spanning 27 counties in nine states, related to 67 different wind facilities (Hoen *et al*. 2013). These homes were within 10 miles of 67 different wind facilities, and 1,198 of the sales analyzed were within 1 mile (1.6 km) of a turbine, giving a much larger data set than previous studies have collected. The data span the periods well before announcement of the wind facilities to well after their construction (Hoen *et al.* 2013).

Two types of models were employed during the study to estimate property-value impacts: (1) an ordinary least squares model, which is standard for this type of study, and (2) a spatial-process model, which accounts for spatial variability. These models allow the researchers to control for home values before the announcement of a wind facility (as well as the post-announcement, pre-construction period), the spatial dependence of unobserved factors effecting home values, and value changes over time. A series of robustness models was also employed to add an additional level of confidence to the study results (Hoen *et al.* 2013).

Regardless of model specification, the results of the study revealed no statistical evidence that home values near turbines were affected in the post-construction or post-announcement/pre-construction periods. Therefore, the authors conclude that if effects do exist, either the average impacts are relatively small (within the margin of error in the models) and/or sporadic (impacting only a small subset of homes) (Hoen *et al*. 2013).

Research has consistently demonstrated that, in a variety of spatial settings and across a wide temporal scale, sale prices for homes surrounding wind energy facilities are not significantly different from those attained for homes sited away from wind energy facilities.

9.3 Recreation and Tourism

The Town of Windsor and surrounding area offers a range of entertainment and recreational services, including amusement parks, exhibition grounds, museums, theatre, and dining. The Windsor region is well-known throughout the province for many activities coinciding with the fall harvest including apple picking, farmers markets and pumpkin festivals.

Existing outdoor recreation in the vicinity of the Project site includes snowmobiling, ATVing, hunting, fishing, golfing, camping and hiking. Coyote Hill Golf Course and Driving Range, a par 35, 9 hole course, is located 7.2 km north of the site. Smiley's Provincial Park is located approximately 11 km northeast of the site, which includes a campground, picnic area, playground and walking trails. Boulderwood Stables is located approximately 8.7 km northeast of the Project Site, which offers year-round trail riding, day camps, and swimming. Panuke Lake Nature Reserve brings a variety of recreational opportunities including hunting, fishing, wildlife viewing, and boating. Fishing is a popular activity in the area, with nearby Panuke Lake hosting an annual Smallmouth Bass Tournament. The existing roads and trails within the Project site are frequently used by local hunters, ATV and snowmobile associations including the Hants Sno-Dusters Snowmobile Association.

The 2011 Nova Scotia Visitor Exit Survey Community Report outlines the total trips (stopped or stayed) to communities in Nova Scotia, to particular tourist regions, as well as capture rates of communities within tourist regions (Nova Scotia Department of Economic and Rural Development and Tourism 2011). The nearest communities to the Project site examined were Windsor, Hantsport, and Brooklyn in the Fundy Shore and Annapolis Valley region and Mount Uniacke in the Halifax Regional Municipality. Table 9.6 shows the total trips (people who stopped for at least 30 minutes or stayed overnight) that were made to these communities as well as their capture rate (the percentage of parties that stopped in a specific community compared to other communities within the region) out of the total number of parties who visited the tourism region.

Table 9.6: Communities Visited in Nova Scotia

Region/Community	Total Trips (% who stopped or stayed)	Capture Rate (%)
Fundy Shore and Annapolis Valley	**37%**	
Windsor	5%	14%
Hantsport	2%	4%
Brooklyn	2%	4%
Halifax Regional Municipality	**79%**	
Mount Uniacke	2%	2%

Source: NSDERDT 2011

The low percentage of total trips and capture rate suggests that tourism is not a major economic driver in the immediate vicinity of the Project site.

It is difficult to determine with certainty how tourists will react to a wind development. Wind farms are objects of fascination for many and thus can generate tourism for the local community. Some wind farms attract thousands of visitors per year and the benefits of even drawing a fraction of that amount of visitors to a community can be felt by many businesses including shops, restaurants and hotels (CanWEA 2006a). Pincher Creek, Alberta developed a 19 MW wind farm in 1993, since that time tourism revenue from visitors from as far away as Russia has generated $5,000 in annual sales of clothing and souvenirs branded with the “Naturally Powerful Pincher Creek” logo (CanWEA 2006a). The North Cape Wind Farm, a 10.56 MW wind facility located near Tignish Prince Edward Island, has become a regional attraction, bringing in over 60,000 visitors per year. The provincial government constructed a restaurant and gift shop at the site, resulting in a capital expenditure of $1.4 million. At the time of publication, the restaurant and gift shop were generating approximately $260,000 in annual revenue and employing 20 seasonal workers from mid-May to the end of October (CanWEA 2006b).

A 2002 study by Market and Opinion Research International interviewed tourists visiting Argyll and Bute, Scotland and asked them about their attitudes towards the presence of wind farms in the area. Of those who knew about the surrounding wind farms (40% of those interviewed), 43% felt that wind farms had a positive effect on the area, 43% felt it made no difference, and 8% felt it had a negative effect (Market and Opinion Research International 2002).

The turbines will consist of a small footprint on privately owned land. The Project team is committed to working with local recreational groups to ensure continued access to the site within the bounds of all safety considerations. Therefore, no negative impacts are expected to the broader recreational community.

10.0 CULTURAL AND HERITAGE RESOURCES

10.1 Archeological Resource Impact Assessment

Davis MacIntyre and Associates Limited conducted an ARIA for the Ellershouse Wind Farm in 2013. The assessment included a historic background study and reconnaissance of the Project site to determine the potential for archaeological resources within the site.

Archaeological reconnaissance was conducted in November 2013. The study area at the time of the assessment encompassed the northeastern portion of the proposed 2016 expansion area. The assessment indicated that the immediate Project site was not likely settled by First Nations peoples or by Euro-Canadians. Historic maps and documents indicate that there was a settlement to the north of the site in the late 19th century, and that logging camps existed, particularly to the west of the site. Logging roads, some of which are still in existence, pass through the site; however the reconnaissance did not reveal any past cultural activity aside from 20th and very early 21st century logging. The site has been determined to be of low archaeological potential and, therefore, no further mitigation had been recommended (Davis MacIntyre and Associates Ltd. 2013).

The ARIA was forwarded to the NS Department of Communities, Culture and Heritage for review. Based on the assessment and recommendations provided, no further mitigation was required.

11.0 OTHER CONSIDERATIONS

11.1 Shadow Flicker

Shadow flicker can occur when rotating blades cast flickering shadows during times of direct sunlight. The magnitude of shadow flicker is determined by the position and height of the sun, wind speed and direction, geographical location, time of year, cloud cover, turbine hub height and rotor diameter, and proximity to the turbine (CanWEA 2011).

For shadow flicker to occur, the following criteria must be met:

1. The sun must be shining and not be obscured by clouds/fog.
2. The source turbine must be operating.
3. The wind turbine must be situated between the sun and the shadow receptor.
4. The wind turbine must be facing directly towards, or away from, the sun such that the rotational plane of the blades (*i.e.*, rotor plane) is perpendicular to the azimuth of incident sun rays. For this to occur, the wind direction would have to be parallel to the azimuth of the incident sun rays throughout the day.
5. The line of sight between the turbine and the shadow receptor must be clear. Light-impermeable obstacles, such as vegetation, tall structures, etc., will prevent shadow flicker from occurring at the receptor.

6. The shadow receptor has to be close enough to the turbine to be in the shadow.

A shadow flicker assessment was completed for the proposed Project to assess the potential impact on surrounding shadow receptors. The analysis was conducted using the WindPRO version 3.1 software package, assuming worst case scenario conditions, including constant sunshine and receptor windows oriented perpendicular to the rotational axis of the turbines. There are no municipal, provincial, or federal guidelines related to shadow flicker, but many jurisdictions (including NSE) have adopted the industry standard of no more than 30 hours of shadow flicker per year, or no more than 30 minutes of shadow flicker on the worst day of the year at residential receptors. These guidelines were used in the shadow flicker assessment for the Project and do not apply to commercial receptors.

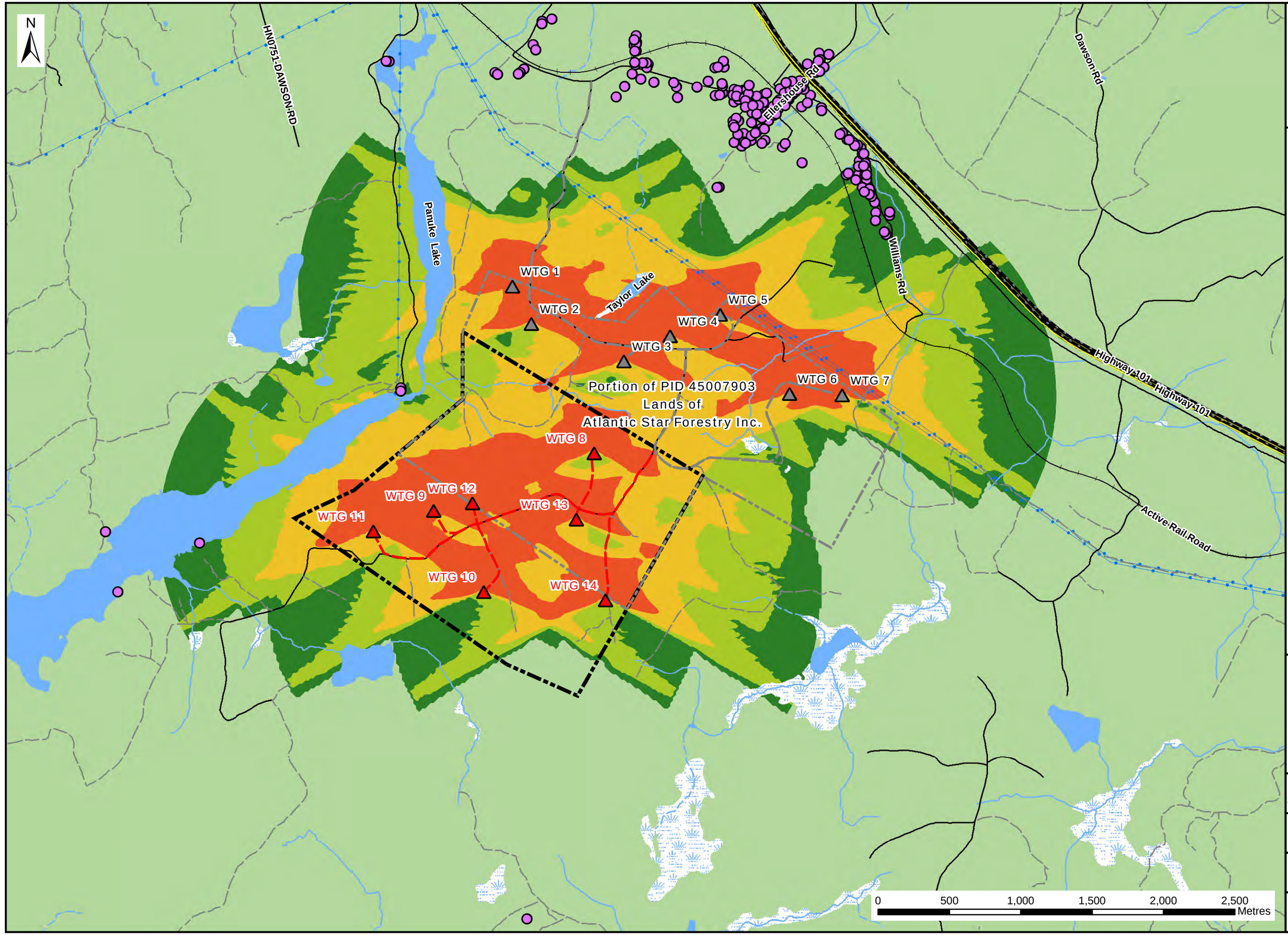
A list of 5 potential receptors, within 2 km of the Project site, was developed using GIS data from the Nova Scotia Geomatics Centre and aerial imagery. For modeling purposes, the receptor list is considered to be conservative as no distinction has been made between habitable dwellings and barns, sheds, or outbuildings. Modeling results indicate that all residential receptors are predicted to comply with the industry standard of no more than 30 minutes of shadow flicker on the worst day, and no more than 30 hours of shadow flicker per year. To assess the cumulative impact resulting from the addition of seven turbines to the existing wind farm, a second assessment was conducted to assess the potential impact on receptors surrounding the entire Ellershouse Wind Farm (14 turbines in total). A total of 194 receptors were generated, and modelling results indicate that all residential receptors are predicted to comply with the industry standard (Drawing 11.1). Detailed results are provided in Appendix H.

11.2 Electromagnetic Interference

The rotating blades and support structures of wind turbines can interfere with various types of electromagnetic signals emitted from telecommunication and radar systems (RABC and CanWEA 2012). In response to this phenomenon, the Radio Advisory Board of Canada (RABC) and CanWEA developed guidelines for assessing the EMI potential from a wind turbine development. These guidelines outline a consultation based assessment protocol that establishes areas, called “consultation zones”, around transmission systems, based on the type and function of the system. Consultation with relevant agencies was completed throughout the EA process and results are provided in Table 11.1.

Table 11.1: Radar Transmission Array Interference Consultation Results

Signal Source	Operator	Required/Suggested Consultation Zone Radius	Consultation Results
Air defense and air control radar systems	Department of National Defense (DND)	100 km	Correspondence submitted on November 3, 2016 – still awaiting response.
DND Radio Communications	DND	n/a	Correspondence submitted on November 4, 2016 – still awaiting response.
Maritime vessel traffic system radars	Canadian Coast Guard	60 km	Correspondence submitted on November 4, 2016 – no objection.



Notes:

1. Reference: Digital Topographic Mapping by Nova Scotia Geomatics Centre.
2. Projection: NAD83(CSRS), UTM Zone 20 North.
3. Shadow Modelling Shown is Approximate & was Established using WindPro 3.1. Turbine Specifications Used in Modelling Processes was Provided by Client.

Legend:

- Existing Noise Receptors
- Proposed Turbines
- Existing Turbines
- Proposed Access Road
- Existing Access Road
- Expansion Project Site
- Former Project Site Boundary
- Active Railroad
- Major Roads and Highways
- Public Roads
- Access Roads / Trails
- Existing Transmission Lines
- Mapped Stream
- Mapped Indefinite Stream
- Water Bodies
- Mapped Wet Area

Shadow Modelling Results
Predicted Shadow (Hrs / Yr)

- 0 - 10
- 10 - 30
- 30 - 100
- 100 +

Ellershouse Wind Project - Shadow Modelling Results

Strum Consulting — 20 Years Taking Charge
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*Bedford * Antigonish * Moncton * Deer Lake*

Date: September 2016	Project #: 16-5807
Scale: 1:25,000	Drawing #: **11.1**
Drawn By: H. Serhan	
Checked By: S. Duncan	

Signal Source	Operator	Required/Suggested Consultation Zone Radius	Consultation Results
VHF omnidirectional range	NAV Canada	15 km	Correspondence submitted on November 3, 2016 – still awaiting response.
Primary air traffic control surveillance radar		80 km (primary surveillance) 10 km (secondary surveillance)	Correspondence submitted on November 3, 2016 – still awaiting response.
Weather radar	EC	50 km	Correspondence submitted on November 3, 2016 – no objection.
Radiocommunication Systems	RCMP	n/a	Correspondence submitted on November 4, 2016 – still awaiting response.

Received responses are provided in Appendix I.

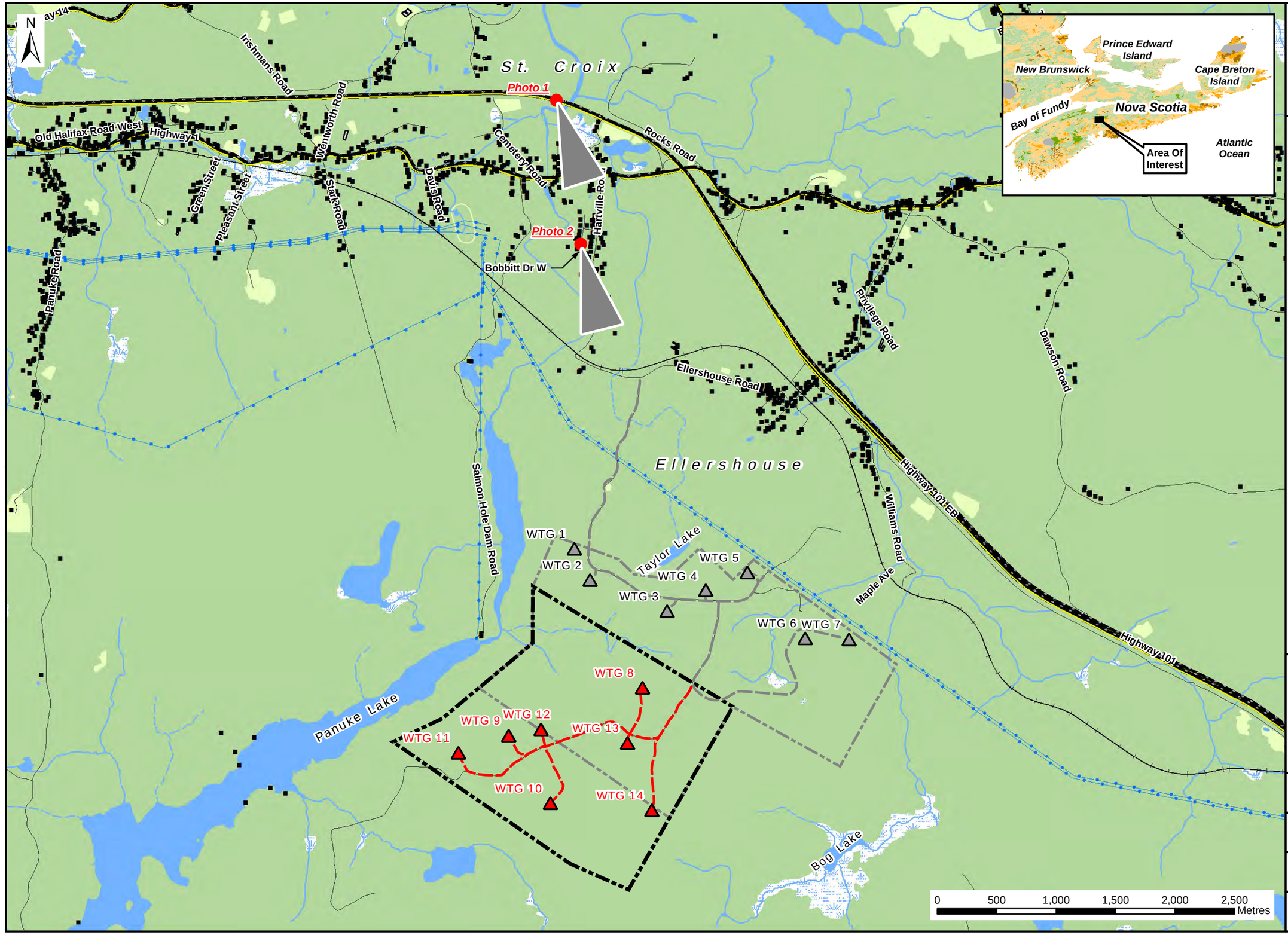
Should additional layout modifications be required, the above agencies will be provided with the updated information, as appropriate.

11.3 Visual Impacts

Predicted View Plane
To assess the potential impact on visual aesthetics in the local area, representative photos were taken from vantage points within the community to complete a Visual Impact Assessment.

Photographs were collected with magnetic bearings and a GPS waypoint recorded at each photo location. Geographical Information System (GIS) software was used to plot the photo locations and construct bearing lines to assist in the construction of a 3D view, generated using the GIS. A 3D surface was then constructed using the provincial Digital Elevation Model points from the Nova Scotia Topographic Database, which supports 5 m contour intervals. The proposed turbine location and specifics regarding the height of the turbine were used to develop the view plane. Each selected viewing site was created using the viewer location (photo GPS point, elevation, and bearing line) resulting in an accurate 3D view. The resulting computer generated view was then merged with the digital photographs using a scaled image of the proposed turbine.

Photos were taken from two locations, shown in Drawing 11.2. Simulated results are provided in Figures 11.1-11.2.



Notes:

1. Reference: Digital Topographic Mapping by Nova Scotia Geomatics Centre.
2. Projection: NAD83(CSRS), UTM Zone 20 North.
3. GPS Data Collected is Typically to +/-5m Accuracy.

Legend:

- Visual Assessment Location
- Proposed Turbines
- Existing Turbines
- Proposed Access Road
- Existing Access Road
- Expansion Project Site
- Former Project Site Boundary
- Building
- Active Railroad
- Existing Transmission Lines
- Large Structure
- Mapped Stream
- Mapped Indefinite Stream
- Water Bodies
- Mapped Wet Area
- Cleared Area

Ellershouse Wind Farm Phase 3 - Visual Assessment Locations

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*Bedford * Antigonish * Moncton * Deer Lake*

Date: October 2016	Project #: 16-5807
Scale: 1:30,000	Drawing #: 11.2
Drawn By: Drawer	
Checked By: S. Duncan	

Figure 11.1: Actual (above) and simulated (below) views looking south from Bobbitt Drive West.

Figure 11.2: Actual (above) and simulated (below) views looking south from Highway 101 near the St. Croix River.

11.4 Sound

Sound from wind turbines comes from two general sources: the mechanical equipment, and the sound from the interaction of the air with the turbine parts, primarily the blades (NSDE 2008). In modern turbine designs, much of the mechanical noise is mitigated through the use of sound insulating materials. Aerodynamic noise, however, is a product of the turning of turbine blades and is thus an unavoidable aspect of wind power operations. Turbines can emit noises of different frequencies, and an individual's perception of the sound can depend on hearing acuity and tolerance for particular sound types (NRC 2007). Furthermore, the propagation of sound from the turbine source to a receptor, such as a residential dwelling, is influenced not only by the sound power level emitted from the turbine, but also by local factors such as distance to the receptor, topography, and weather conditions (Hau 2006). For example, increases in wind speed result in increases in ambient, natural noise (from vegetation movement) that can mask the sounds emitted from the turbine(s) (NRC 2007).

Nova Scotia has no specific sound guidelines for wind farms; however, through the EA process, NSE requires that predicted noise levels at identified residential receptors (as well as camps/cottages, daycares, hospitals and schools) not exceed 40 dBA. As this guideline is intended to be protective of human sleep disturbance, 40 dBA does not apply to commercial or vacant lot receptors. This guideline was used in the current sound assessment for the Project.

Acoustic Assessment

An acoustic assessment was conducted for the Project to predict sound pressure levels at identified receptors within a 2 km radius of the proposed turbine locations. The assessment was completed using the WindPro v. 3.1 software package. For the purposes of this model, receptors included all structures identified in the provincial topographic mapping, as well as any additional identifiable structures based on aerial imagery. No attempt to distinguish sheds and outbuildings from dwellings or cottages was made. The model followed ISO 9613-2 Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method and calculations, and was based on the following input information:

- UTM coordinates for the wind turbines;
- 1/1 Octave band sound power level data, either provided by the manufacturer or calculated by WindPro, for the wind turbines;
- UTM coordinates for receptors (all structures within a 2 km radius of the Project site were evaluated – 5 receptors in total);
- A wind speed of 10 m/s, the speed at which the highest sound power level output is achieved (based on test data from the manufacturer); and
- Topographic data for the surrounding area.

The ISO 9613-2 calculation method assumes meteorological conditions that are ideal for noise propagation, including a ground temperature of 10°C and 70% relative atmospheric humidity. A ground factor of 0.7 was applied to the model, representing predominantly porous ground (*i.e.*, capable of vegetative growth) interspersed with hard surfaces (*e.g.,* water).

A total of 5 structures were identified within a 2 km radius of the proposed turbine locations. Modeling results indicated that no existing structure has predicted sound levels exceeding 40 dBA. To assess the cumulative impact resulting from the addition of seven turbines to the existing wind farm, a second assessment was conducted to predict sound pressure levels at identified receptors within a 2 km radius of the entire Ellershouse Wind Farm (14 turbines in total). A total of 194 structures were identified within a 2 km radius of the wind farm. Modeling results indicated that no existing structure has predicted sound levels exceeding 40 dBA (ranges were from 28.40 to 39.10 dBA). Mapping illustrating the predicted sound levels relative to structures is provided in Drawing 11.3. Excessive noise resulting from turbine operation is not expected to be an issue at any existing dwellings/residences. Detailed results are provided in Appendix J.

A literature review related to infrasound is provided in Appendix C.

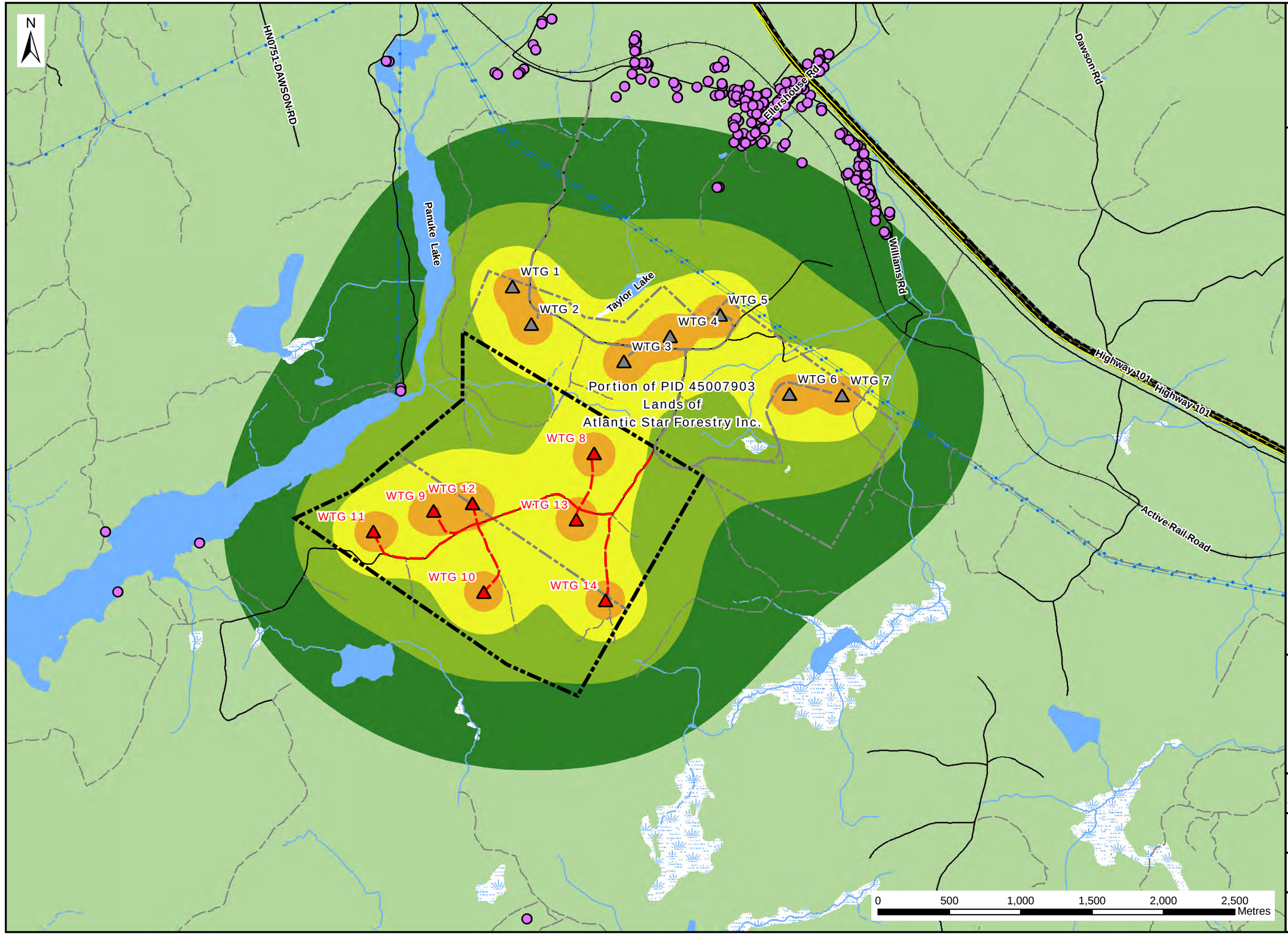
12.0 CONSULTATION AND ENGAGEMENT

12.1 Public Consultation

The Project team will continue to consult with the public regarding Project development. To date, the Project team has delivered presentations to local residents, the CLC, and special interest groups. A summary of the consultation for this Project is provided in Table 12.1. Detailed information on the open house event and the website is provided below.

Table 12.1: Consultation Meetings and Events

Date	Participants	Format/Activity
July 22, 2016	NSDNR, NSE	Introduction of project expansion, discussion on field work requirements
September 13, 2016	CLC	Community Liaison Committee meeting. Introduced project to committee members
September 14, 2016	Chuck Porter	Phone discussion with Chuck Porter MLA introducing expansion project
September 14, 2016	West Hants Planning Department	Notification of expansion project was sent to the West Hants planning department
October 19, 2016	KMKNO	Notification of project was sent to KMKNO
October 19, 2016	Office of Aboriginal Affairs	Notification of the project was sent to office of aboriginal affairs
October 20, 2016	Glooscap First Nation	Notification of the project was sent to Glooscap First Nation. Minas Energy is scheduled to make a general presentation on wind power to the Glooscap on January 31, 2017



Notes:

1. Reference: Digital Topographic Mapping by Nova Scotia Geomatics Centre.
2. Projection: NAD83(CSRS), UTM Zone 20 North.
3. Sound Modelling Shown is Approximate and was Established using WindPro 3.1. Turbine Specifications Used in Modelling Processes was Provided by Client.

Legend:

- Existing Noise Receptors
- Proposed Phase 3 Turbines
- Existing Turbines
- Proposed Access Road
- Existing Access Road
- Expansion Project Site
- Former Project Site Boundary
- Active Railroad
- Major Roads and Highways
- Public Roads
- Access Roads / Trails
- Existing Transmission Lines
- Mapped Stream
- Mapped Indefinite Stream
- Water Bodies
- Mapped Wet Area

Sound Modelling Results

Predicted Sound Level (dBA)

- 35 - 40
- 40 - 45
- 45 - 50
- 50 - 55
- 55 +

Ellershouse Wind Project - Sound Modelling Results

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Date: September 2016	Project #: 16-5807
Scale: 1:25,000	Drawing #: **11.3**
Drawn By: H. Serhan	
Checked By: S. Duncan	

Date	Participants	Format/Activity
October 20, 2016	Annapolis Valley First Nation	Notification of the project was sent to the Annapolis Valley First Nation
October 20, 2016	Native Council of Nova Scotia	Notification of the project was sent to the Native Council of Nova Scotia
November 1, 2016	Open House	An open house meeting was held at the Ellershouse community hall to inform the public on the project and share details of the Environmental Assessment process

Community Relations Manager
Kris MacLellan, of Minas Energy is serving as the Community Relations Manager for the Project. This role involves coordinating meetings, addressing community concerns and answering questions, as well as acting as a liaison between the community and the Project team.

Community Liaison Committee
A CLC has been created for the Project, to act as an advisory body to the development team, to provide a forum for the two way exchange of information, and to bring questions and concerns forward to the development team. The CLC is chaired by John Woods of Minas Energy, and is formed by nine additional members, who represent the interests of local residents, landowners, recreational groups and local businesses from Ellershouse and surrounding areas.

CLC meetings are held regularly, and are attended by CLC members and Project team representatives, while members of the public are always welcome to attend. The CLC will continue to meet regularly and to play a role throughout the development of the Project over the coming years. All CLC meeting minutes are posted at the Ellershouse post office.

The CLC has been in operation for 3 years, and over that time, have developed a thorough understanding of environmental and health considerations with regard to the wind farm development. Topics that have been covered at the CLC include:

- Blasting;
- Health effects;
- Effects on property values;
- Community benefits;
- Transportation of turbines;
- Sound from construction and operations;
- Shadow Flicker;
- Visual Impact;
- Permitting process; and
- Infrasound

Open House Events

A community open house was held at the Ellershouse Community Hall on November 1, 2016. Representatives from Minas Energy as well as a member of AREA were present to provide information on the proposed wind energy Project as well as to answer any questions or concerns from community members. The open house featured posters sharing information on the Project team, benefits to the area, the EA process, and an overview of Project sound, shadow flicker and visual assessment studies. Copies of the posters and newsletter from the open house are provided in Appendix K.

Attendees had the opportunity to speak one-on-one with Project team members and express comments and/or questions. Attendees were able to review Project information and voice comments and concerns in various ways including:

- Read Project posters and the newsletter; and
- Speak one-on-one with Project team members.

The open house was attended by approximately 30 people. A concern was raised by a community member concerning the visual impact of the expansion. This concern will be addressed by undertaking a photomontage from the property owner's residence.

The Project Team will continue to help address any concerns raised by local citizens over the duration of the Project's development.

Figure 12.1: Open house held in Ellershouse, November 1, 2016

Newsletters

Newsletters are circulated regularly to residents using community mail distribution. Four hundred (400) newsletters are circulated covering the St. Croix and Ellershouse areas. In addition newsletters are posted in Brooklyn and Garlands Crossing. One newsletter has been released in

relation to the expansion project which also served as advertising for the Open House. The newsletter, released in October 2016, is provided in Appendix K.

Email List
An email list is also maintained by the Project Team, to which all interested parties are welcome to subscribe. Project information, newsletters and announcements of public meetings are circulated through a community email list.

12.2 Aboriginal Engagement

Due to the Project's proximity to Mi'kmaq First Nations communities, a letter detailing Project information was provided to each of the following groups/communities:

- Kwilmu'kw Maw-klusuaqn
- Nova Scotia Office of Aboriginal Affairs;
- Annapolis Valley First Nation;
- Glooscap First Nation; and
- Chief Grace Conrad, Native Council of Nova Scotia.

Copies of these letters can be found in Appendix K.

12.3 Review of Public Concerns

Issues and concerns raised by the public and other stakeholders throughout the consultation process to date can be grouped into seven broader categories which have been assessed throughout the EA.

Concerns include:

- Potential effects from sound generated by wind turbines;
- Potential effects on property values on lands near the Project site;
- Potential effects to the visual landscape around the Project site;
- Potential effects to birds and other wildlife from the construction and operation of wind turbines;
- Concerns regarding public health and safety;
- Benefits to the local community; and
- Recreational access and land-use.

Sound
Residents living near the Project site expressed concerns over the potential for noise during construction and decommissioning phases of the Project, as well as annoyance from noise generated by turbine blades during operation.

Mitigation measures related to construction and decommissioning activities are provided in Section 4.5 and will be further assessed in the Project EPP.

Sound modeling was completed to ensure that sound levels generated by operating turbines at all existing receptors will comply with the NSE standard of 40 dBA (exterior of the residence).

Additional details regarding sound assessment methodology and results are provided in Section 11.4. Infrasound is considered in the Human Health Literature Review provided in Appendix C.

Property Values
Potential effects on property values have been identified as a concern of neighboring residents. A review was completed on available literature related to the effect of wind farms on surrounding property values and a discussion is provided in Section 9.2.

Visual Landscape
Photos taken from locations near the Project site were used to create simulated images of the view plane for public viewing. Additional details and results of the visual assessment for the Project are provided in Section 11.3.

Birds and Wildlife
The public has raised concerns about mortality of birds and bats resulting from collisions with wind turbines. Sensory disturbances, as well as habitat loss for birds, bats and other forms of wildlife are also common concerns.

Extensive desktop and field studies have been completed to assess birds, bats and other wildlife and associated habitats at or near the Project site. Extensive consultation has been ongoing with NSDNR and CWS to ensure due diligence is practiced with regards to wildlife. The Proponent has committed to ongoing monitoring as requested by these agencies.

Details on wildlife methodology and results for fish, terrestrial fauna, birds, and bats are provided in Sections 8.3, 8.6, 8.7 and 8.8, respectively.

Public Health and Safety
The public is often concerned about the potential for effects to health and safety from wind turbines. In addition to sound levels, common concerns include infrasound, shadow flicker and the risk of ice throw. Due to the distance between Project infrastructure and potential receptors, no adverse shadow flicker impacts to residential receptors are expected.

A literature review regarding additional potential for effects to health and from wind turbines was also completed. The main findings of this review are provided in Appendix C.

Benefits to the Local Community
A common question that has been asked during CLC meetings and community events is what benefits the local community can expect from the construction of the Project, given that the power generated from the wind farm will be provided to the Towns of Berwick, Mahone Bay and Antigonish. One of the main objectives of the CLC is to help the Project team identify Project-related opportunities and benefits specific to the local community. Community benefits expected from the Project are outlined in Section 9.1.4.

Recreational Access and Land Use
The Project site is frequently used by various local groups for recreational activities - snowmobiling, hunting, ATVing and cottaging in particular. Concerns have been raised about the impacts the Project could have on safety and access to these lands by current users. Discussions are ongoing about conditions under which main access roads can remain accessible and the Project Team is committed to working with recreational groups on this matter, within the bounds of safety.

13.0 EFFECTS ASSESSMENT

Based on the discussion in Section 7, the following were identified as VECs:

- SOCI (fauna);
- Avifauna; and
- Bats.

To ensure all relevant issues and concerns related to the proposed Project are identified, an interaction matrix was used to evaluate the interactions between the Project phases and the VECs (Table 13.1). The potential for accidents and malfunctions is also considered for each Project phase.

Table 13.1: Interaction Matrix

Project Phases/Activities	SOCI (fauna)	Avifauna	Bats
Site Preparation and Construction			
Land Surveys for Placement of Roads, Turbines and Associated Works		X	
Geotechnical Investigations	X	X	
Placement of Sedimentation and Erosion Control Measures			
Clearing of Trees and Grubbing Areas for Construction	X	X	X
Access Road Upgrading and Construction	X	X	X
Laydown Area and Turbine Pad Construction	X	X	X
Transportation of Turbine Components			
Turbine Assembly	X	X	X
Grid Connection			
Removal of Temporary Works and Site Restoration			
Commissioning			
Operation and Maintenance			
General Operation and Maintenance	X	X	X
Vegetation Management	X	X	
Decommissioning			
Dismantling and Removal of Turbines from Project Site	X	X	X
Removal of Turbine Foundations to Below Grade and Reinstatement of Topsoil	X	X	X

Project Phases/Activities	SOCI (fauna)	Avifauna	Bats
Removal of On-site Roads and Reinstatement of Lands	X	X	X
Removal and Disposal of Collection System, Conductor and Poles	X	X	X
Removal of All Other Equipment and Stabilization of Lands	X	X	X

13.1 Environmental Effects Analysis Methodology

The completion of the environmental effects analysis involves consideration of the following elements:

- Description of potential negative environmental effects;
- Mitigation measures;
- Residual effects;
- Significance of residual environmental effects; and
- Monitoring or follow up programs.

This EA is structured to include proposed mitigation to reduce or eliminate potential adverse environmental effects. The determination of significance of adverse environmental effects is based on post-mitigation (residual) effects, rather than unmitigated potential effects. The significance of residual effects of the Project will be determined using the criteria, based on federal and provincial EA guidance (Table 13.2).

The expectation for, and significance of, residual effects determines the need for a monitoring and/or follow-up program.

Table 13.2: Criteria for Identification and Definition of Environmental Impacts

Attribute	Options	Definition
Scope (Geographic Extent)	Local	Effect restricted to area within 1 km of the Project site
	Regional	Effect extends up to several km from the Project site
	Provincial	Effect extends throughout Nova Scotia
Duration	Short-term	Effects last for less than 1 year
	Medium-term	Effects last for 1 to 10 years
	Long-term	Effects last for greater than 10 years
Frequency	Once	Occurs only once
	Intermittent	Occurs occasionally at irregular intervals
	Continuous	Occurs on a regular basis and regular intervals
Magnitude	Negligible	No measurable change from background in the population or resource; or in the case of air, soil, or water quality, if the parameter remains less than the standard, guideline, or objective
	Low	Effect causes <1% change in the population or resource (where possible the population or resource base is defined in quantitative terms)
	Moderate	Effect causes 1 to 10% change in the population or resource
	High	Effect causes >10% change in population in resource

The potential level of impact after mitigation measures are applied (*i.e.*, residual effects) was identified based on the criteria and definitions provided in the NRCan document, "Environmental Impact Statement Guidelines for Screenings of Inland Wind Farms Under the Canadian Environmental Assessment Act" (NRCan 2003) (Table 13.3).

Table 13.3: Definition of Significant Residual Environmental Impact

Significance Level	Definition
High	Potential effect could threaten sustainability of the resource and should be considered a management concern. Research, monitoring, and/or recovery initiatives should be considered.
Medium	Potential effect could result in a decline in resource to lower-than-baseline but stable levels in the study area after Project closure and into the foreseeable future. Regional management actions such as research, monitoring, and/or recovery initiatives may be required.
Low	Potential effect may result in slight decline in resource in study area during life of the Project. Research, monitoring, and/or recovery initiatives would not normally be required.
Minimal/None	Potential effect may result in slight decline in resource in study area during construction phase, but should return to baseline levels.

13.2 Effects Assessment

Effects and mitigation measures related to each VEC are described below. Potential effects of the Project on the identified VECs are further analyzed in Tables 13.4 to 13.6 to identify and evaluate the significance of residual effects, based on the criteria listed above. Mitigation measures are also summarized.

13.2.1 Species of Conservation Interest

It is widely acknowledged that wind energy development can have a suite of potential direct and indirect impacts on terrestrial fauna (Arnett *et al.* 2007; Kuvlesky, Jr. *et al.* 2007). General construction activities within and adjacent to watercourses and water bodies, can affect aquatic fauna and habitat. The extent and magnitude of these impacts can vary with the stage of the Project but are present for all phases.

During the site preparation and construction phases of wind energy projects, potential impacts to SOCI will be related to:

- sensory disturbance;
- habitat loss/alteration and/or fragmentation;
- effects on fish passage/migration; and
- mortality.

Sensory Disturbance

Sensory disturbance to fauna SOCI may occur from a variety of anthropogenic sources. For wind energy projects, disturbance impacts are typically most significant during the construction phase, which involves increased presence of on-site personnel, vehicles, and heavy equipment (Helldin *et al.* 2012). Avoidance impacts related to the construction phase have been reported for large mammals in two cases [*e.g.*, Rocky Mountain Elk (*Cervus elaphus*) (Walter *et al*. 2006) and wolves

(Álvares *et al.* 2011)], but in both cases the effects were temporary and subsided once construction was completed. It is expected that avoidance or displacement effects related to the site preparation and construction phases of the Project will not persist in the long-term.

It is also important to distinguish wind energy facility roads from high-use motorways in regards to sensory disturbance. Many of the documented effects of roads are related to avoidance due to traffic noise (Forman and Alexander 1998). The magnitude of such effects will be greatly reduced in the context of this wind energy development, as road traffic will be minimal (maintenance vehicles during operations) and limited.

Sensory disturbance during the operations and maintenance phase of the Project will be limited to the presence of on-site personnel conducting maintenance on Project infrastructure. Although literature on the topic is sparse, most evidence suggests that in general, terrestrial wildlife are not adversely effected by operating wind turbines. It was determined that a population of elk in Oklahoma, for example, did not change their home range or experience reduced dietary quality within an operating wind power development (Walter *et al.* 2006). It is therefore unlikely that ungulates in the Project site, including White-tailed deer and Mainland moose, will be affected. Likewise, the small mammal community at a wind energy development in Spain was demonstrated to be unaffected by turbine operations (de Lucas *et al.* 2005).

Impacts to fauna SOCI during the decommissioning phase of the Project will be similar to those experienced during the site preparation/construction phase (Helldin *et al.* 2012). Namely, sensory disturbance due to the increased presence of on-site personnel and the operation of heavy equipment may elicit temporary displacement/avoidance behaviours in mobile wildlife species. No sensory disturbance impacts are expected for fish SOCI.

Habitat Loss/Alteration

Although the permanent footprint of a wind energy facility is generally estimated to be just 5 to 10% of the Project site (Arnett *et al.* 2007), there is the potential that significant habitat elements for certain fauna SOCI may altered/removed during site preparation activities, such as clearing, for turbine pads and access roads. However, the effects may be negligible if the habitat is in adequate supply in the general area surrounding the Project site (Arnett *et al.* 2007). Since the turbine footprint represents approximately one percent of the Project site and habitat types at the Project site are common in the surrounding landscape, the effects of habitat loss/alteration on terrestrial fauna SOCI will be minimized.

The construction of roads has a variety of well-documented, adverse effects including fragmentation of otherwise continuous segments of suitable habitat and restriction of movement of individuals between habitat patches (Trombulak and Frissell 2000, Eigenbrod *et al.* 2008), avoidance of adjacent habitat, increased access for hunters/poachers (Brody and Pelton 1989; Helldin *et al.* 2012), which can potentially result in increased mortality of certain wildlife species while also facilitating the expansion of interspecific competitors (Beazley *et al.* 2004) and exotic species (Trombulak and Frissell 2000). The road network for this Project will have a small footprint due to the overall size of the Project and the incorporation of the existing road network into the Project design, which will significantly reduce the magnitude of any potential effects.

The potential effects of the Project on fauna SOCI habitat during the operational phase are likely to be minimal. Aside from surface disturbance and the possible removal of regenerated vegetation, decommissioning will not include additional habitat loss/alteration. Therefore, the impacts to fauna SOCI during this phase of the Project are not expected to be significant in magnitude or long-term in duration.

Collision Mortality
Increased vehicle and heavy equipment traffic during all phases of the Project may result in collisions with terrestrial wildlife. It is expected that these collision events will be minimized by the implementation of safe work practices (*e.g.*, strict adherence to speed limits, obeying all warning signs, etc.). Collisions, should they occur, will be infrequent and will not have a significant effect on population levels.

General Mitigation Measures
The following specific mitigative measures will be implemented to avoid and mitigate any potential effects on SOCI:

- Minimization of the footprint of physical disturbance by:
    - Alignment of access roads with existing roads and logging trails, wherever possible.
    - Where the aforementioned is not possible, designing and constructing access roads to avoid environmentally sensitive habitats, where possible, and ensuring the most efficient means to access turbines is achieved.
    - Maintenance of a buffer around sensitive habitats such as wetlands, where possible.
    - Minimizing routine vegetation clearing:
        - clearing of land only if required for construction area footprint;
        - restoration of areas of disturbance where possible, post construction; and
        - siting construction compounds in/on non-sensitive areas.
- Completion of a comprehensive schedule and determination of timelines to efficiently complete Project activities within the shortest time frames possible.

Species-Specific Mitigation
Desktop and field analyses for fauna SOCI revealed several species that have the potential to occur at the Project site. Addressing the potential impacts of the Project on these species will require species-specific mitigation techniques, as described below:

Fisher:
- Minimize disturbance to mature forest stands, and keep clearing of large mature trees to a minimum;
- Leave coarse woody debris and standing deadwood intact; and
- Avoid disturbance to dispersal corridors, particularly riparian areas.

Long-tailed Shrew:
- Avoid disturbance to talus slope habitat.

Mainland moose:

- Project personnel will report any evidence of Mainland moose to NSDNR.

Monarch:

- Should large congregations of Monarchs be found at the Project site, Project activities in the area should cease until the migrating group has left the Project site. This is most likely to occur in late summer, prior to the fall migration.

Wood turtle:

- Based on recommendations outlined in the document 'Protecting and Conserving Wood Turtles: A Stewardship Plan for Nova Scotia' (MacGregor and Elderkin 2003), and the "NS Transportation and Public Works Generic Environmental Protection Plan for the Construction of 100 Series Highways" (2007), the following general procedures will be implemented to ensure the protection of Wood turtles:
    - Any turtles found will be relocated outside of the construction zone, along the same habitat corridor in the direction of travel the turtle was originally oriented and preferably upstream within the same riparian habitat corridor (< 400 m).
    - Any sightings of wood turtle will be reported to the NS Wood Turtle Recovery Team at 1-866-727-3447.
    - Adequate, permanent buffers of vegetation will be left around important Wood turtle habitat. If necessary (*i.e.*, in the event that Wood turtles are confirmed at the site), an appropriate mixture of shrubs and trees shall be planted to create a buffer.

13.2.2 Avifauna

The effects of a wind farm on birds are variable and depend on factors such as the development design, topography of the area, habitats affected, and the bird community in the wind farm area (Drewitt and Langston 2006). Although some effects are related to construction (*e.g.,* habitat alteration), most potential effects on avifauna are mainly related to operation and may include:

- habitat loss/alteration;
- mortality resulting from direct collision; and
- sensory disturbance.

Habitat Loss/Alteration

Habitat alterations resulting from the site preparation and construction phases of wind energy developments have the potential to impact bird populations either directly or indirectly (Arnett *et al.* 2007). However, impacts are considered less severe than those from other energy extraction developments such as oil and gas exploration because the disturbance is limited to the construction footprint (*i.e.,* turbine pads, roads, associated buildings, etc.) (Kuvlesky *et al.* 2007). The magnitude of these impacts, however, may be magnified if the disturbed area contains sensitive plant communities that provide important habitat to local bird populations (Kuvlesky *et al.* 2007). Altered landscapes can potentially lead to displacement of species with sensitive habitat requirements (Arnett *et al.* 2007). Site clearing and preparation may involve the removal of key habitat features, such as standing deadwood, mature trees, or shrub cover required as foraging and/or breeding habitat for certain bird species.

Mid-aged to mature forest, for example, is present at the Project site and its removal may displace bird species into other mature stands in the general area. Surface disturbance is greater in the construction phase than in the operational phase because large right of ways need to be created to accommodate large construction equipment and transport vehicles (Arnett *et al.* 2007). It can therefore be assumed that impacts associated from direct habitat alteration are greatest in the short-term, except when key habitat features are permanently removed. Depending on the availability of nearby alternative habitat, habitat alterations associated with wind energy infrastructure may have detrimental effects on local bird populations. Avifauna surveys indicated that forest birds were the dominant feature of the Project site's bird community. The landscape of the Project site and immediately surrounding area features forest stands that would appear to provide suitable alternative habitat to bird species displaced due to habitat alteration at the Project site. Those species preferring edge/transitional habitat will also find suitable in the surrounding landscape due to the prevalence of cutovers.

Collision Mortality

The most overt potential effect of the Project on birds is direct mortality resulting from collision with Project infrastructure, namely turbine blades, during the operational phase. Most evidence suggests that mortality levels resulting from turbine collisions are low (EC *et al.* 2012) although many studies do not adequately incorporate carcass removal by scavengers into mortality estimates. In a review of night migrant fatalities at wind farm sites in North America, Kerlinger *et al.* (2010) found fatality rates of less than one bird/turbine/year to approximately seven birds/turbine/year, even with corrections made for scavenger removal and searcher efficiency. Furthermore, multi-bird fatality events, in which more than three birds were killed at a turbine site in a single night, were found to be rare and may have been related to lighting and/or inclement weather (Kerlinger *et al.* 2010). A recent review of Canadian wind farms concluded that less than 0.2% of the population of any species is affected by either collisions with, or displacement by, wind turbines (Zimmerling *et al*. 2013).

Collision risk is greater on or near areas used by large numbers of foraging or roosting birds or in important migratory flyways (Drewitt and Langston 2006). In Canada, passerines account for 70% of all fatalities, with most occurring during the fall migration season (EC *et al.* 2012). The probability of raptor collision with wind turbines depends on the species, turbine height, and local topography (de Lucas *et al.* 2008). Collision risk can therefore be greatly reduced by incorporating knowledge of the avifauna into the design and placement of wind power infrastructure.

In summary, available research suggests that the probability of large-scale fatality events occurring at wind farms is extremely low (Kerlinger *et al.* 2010) and the observed mortality caused by wind energy facilities is low compared to other sources of human caused bird mortality (*i.e*., buildings, communications towers, vehicles, etc.) (Kingsley and Whittam 2005). Baseline information gained from avian surveys can be combined with site specific considerations to greatly reduce the risk of bird collisions. Since no major migratory movements of passerines, shorebirds, waterfowl, or birds of prey were observed at the Project site, it is unlikely that significant mortality events will occur as a result of collisions with Project infrastructure.

Sensory Disturbance

Sensory disturbance to birds can occur during the construction, operational, and decommissioning phases of wind power projects, and can be caused by the increased presence of personnel, vehicle

movement, operation of heavy equipment, and the operation of the turbines themselves (Drewitt and Langston 2006). It is thought that disturbance to birds may have a greater population impact than collisions, although research is lacking in this area (Kingsley and Whittam 2005). Primary concerns with regards to sensory disturbance are related to displacement and potential effects on key physiological processes such as breeding.

Some studies have shown that birds will exhibit avoidance behaviours post-construction, leading to a variable degree of displacement from previously used habitat (reviewed in Drewitt and Langston 2006) which essentially amounts to habitat loss. In most cases, such displacement is on the scale of tens to hundreds of metres, which can lead to localized changes in bird densities (Leddy *et al.*1999; Pearce-Higgins *et al.* 2009). However, while birds may avoid specific sites, the evidence does not suggest that birds abandon the general area as a whole. Other research indicates that the presence of wind turbines has no effect on the distribution of the bird community (Devereux *et al.* 2008) and birds may habituate to the presence of operating wind turbines (Madsen and Boertmann 2008). The tolerance to Project related disturbance may be species specific but may also be related to the availability of alternative habitat (Kingsley and Whittam 2005). Thus, careful site selection of turbines to avoid any unique habitat types will alleviate some disturbance and/or displacement effects, especially during the operational phase of the Project.

General Mitigation Measures
The following mitigative measures will be implemented to avoid and mitigate any potential effects on avifauna:

- Where possible, clearing of site vegetation will be conducted outside of the breeding and nesting season for birds (April to August). If this is not possible, a mitigation plan will be developed in consultation with NSDNR and CWS prior to clearing activities.
- Use of lighting during construction and on turbine hubs and blades will be limited to minimum levels while still meeting requirements of Transport Canada.
- There will be no general lighting at the Project site. Lighting will only be used when technicians are working on-site.
- Where possible, placement of Project infrastructure in habitats significant to bird species (as identified during avian surveys) will be avoided. These include wetlands, mature forests, and areas with large, hollow trees.
- Post-construction monitoring will be implemented under direction from NSE and in consultation with CWS and NSDNR to monitor for significant mortality trends.

13.2.3 Bats
The installation of wind turbines has the potential to impact bats both directly and indirectly (Arnett *et al.* 2007). Although some effects are related to construction (*i.e.*, habitat alteration), most potential effects on bats are mainly related to operation and may include:

- habitat loss/alteration;
- mortality resulting from direct collision and/or barotrauma; and
- sensory disturbance.

The significance of these impacts at the population level depends on a number of biotic and abiotic variables, including the number of individuals affected and the stability of the population, season, physiologic condition of the individuals affected, and weather factors.

Habitat Loss/Alteration

Habitat alterations, including vegetation clearing and soil disruption (NRC 2007) resulting from the site preparation and construction phases, may impact bats (Arnett *et al.* 2007). The removal of trees during the site clearing and preparation phases can be especially detrimental, particularly to those bat species which use trees as roosting habitat (Arnett *et al.* 2007).

Some studies, however, suggest that habitat changes related to wind power developments may in fact create benefits to bats by increasing cleared areas and creating access roads, both of which can be used by bats as foraging habitat (as cited in Arnett *et al.* 2007; Kunz *et al.* 2007a). In relation to this, small-scale disturbances, including creating small cutblocks or small scale access roads through forested habitat, have been shown to stimulate an increase in bat activity relative to previous years (Grindal and Brigham 1998). It is important to note, however, that increased edge habitat due to forest clearing may subsequently increase the risk of mortality by virtue of attracting bats to the area of the operating turbine (Kunz *et al.* 2007b). Despite the fact that the Project site is interspersed with such cutovers, bat activity was determined to be quite low based on pre-construction monitoring.

Mortality

Mortality of bats is a potential effect during the operational phase of wind energy projects. Necropsy of recovered carcasses found that the cause of death for baths killed at wind-energy facilities is an indiscernible combination of direct collision with the turbine blades and barotrauma (Grodsky *et al.* 2011), although more recent pathological research has found that traumatic injury is the major cause of bat mortality at wind farms and that post-mortem artifacts may manifest themselves as pulmonary barotrauma lesions (Rollins *et al.* 2012). Barotrauma is characterized by a drop in atmospheric pressure along the top of a rotating turbine blade, which causes thoracic, abdominal, and pulmonary injury to bats when passing through the low pressure area (Baerwald *et al.* 2008).

Much of the established literature has not attempted to elucidate the causes of bat mortality but has instead reported on the magnitude of mortalities. In Canada, EC reports that bat fatalities outnumber bird fatalities (EC *et al*. 2012). This causes concern as bats are long-lived and have low reproductive rates (Arnett *et al.* 2007).

Research suggests that migratory tree-roosting species suffer the highest fatalities at wind farms (Kunz *et al.* 2007a; Kuvlesky *et al.* 2007; Cryan and Barclay 2009), although deaths of Tri-colored bats constituted 25.4% of total bat fatalities at wind facilities in the eastern United States (as cited in Arnett *et al.* 2007). Migratory species, including Hoary bat, Eastern red bat, and Silver-haired bat, accounted for 71% of 2,270 bat fatalities recorded at wind energy facilities across Canada between 2006 and 2010 (EC *et al.* 2012). Most bat fatalities are reported in the late summer months (Johnson 2005) coinciding with the start of swarming and autumn migration (Arnett *et al.* 2007: EC *et al.* 2012). Periods of high mortality may therefore be linked with the timing of large-scale insect migrations when bats feed at altitudes consistent with wind turbine heights (Rydell *et al.* 2010). It has been found that bat fatalities increase exponentially with wind tower height, with turbine towers 65 m or taller having the highest fatality rates

(Barclay *et al.* 2007). This hypothesis is also supported by the findings of Horn *et al.* (2008), who reported that bats were not being struck by turbine blades when flying in a straight line en route to another destination, but were struck while foraging in and around the rotor-swept zone of the turbine.

Temporal variation in bat activity and subsequent fatality rates can be influenced by weather variables, as well as the characteristics of the facility (Baerwald and Barclay 2011). Although bats exhibit species-specific responses to environmental variables (Baerwald and Barclay 2011), in general they appear to be more active when wind speeds are low, which increases the risk of collisions with rotating turbine blades (Arnett *et al.* 2007) and mortality resulting from barotrauma.

Sensory Disturbance
Increased human presence may also disturb roosting bats (Arnett *et al.* 2007), but it is unknown if this disturbance is sufficient to disrupt normal behaviour or physiology. Sensory disturbance to bats is most likely during the site preparation/construction and decommissioning phase of the Project, during which the presence of on-site personnel and equipment will be the highest. During hibernation, bats are sensitive to human presence, and human intrusion into hibernacula can lead to increased arousals leading to a premature depletion of fat reserves (Thomas 1995). Siting wind-energy facilities away from hibernacula is therefore recommended in the design phases of these projects.

It is unknown if noise associated with the operational phase of wind energy projects has any measureable effect on bats, although it is thought that bats may become acoustically disoriented by the low-frequency noise emitted from rotating turbines (Kunz *et al.* 2007a). Bats have been shown, experimentally, to avoid foraging in areas with intense, broadband noise (Schaub *et al.* 2008), however this research was not conducted in the context of wind-energy development and other studies indicate that bats have been shown to forage in close proximity to operational turbines (Horn *et al.* 2008).

General Mitigation Measures
The following specific mitigative measures will be implemented to avoid and mitigate any potential effects on bats:

- Use of lighting during construction and on turbine hubs and blades will be limited to minimum levels while still meeting requirements of Transport Canada.
- Where possible, placement of Project infrastructure in habitats significant to bat species will be avoided. These include hibernacula, wetlands, and lands directly adjacent to open bodies of water.
- Post-construction monitoring will be implemented under direction from NSE and in consultation with CWS and NSDNR to monitor for significant mortality trends.

13.3 Environmental Effects Analysis
The following tables (Tables 13.4 to 13.6) identify and evaluate the significance of residual effects for each phase of the Project on each VEC. Accidents and malfunctions are also analyzed. As most of the mitigation is the same for avifauna and bats, these VECs are considered together to decrease repetition.

Table 13.4: Environmental Effects Analysis – Construction Phase

Environmental Component	Potential Effect	Mitigation Summary	Significance Criteria	Residual Effects	Significance of Residual Effect
SOCI	• Sensory disturbance • Habitat loss/alteration/degradation and/or fragmentation. • Effects to fish passage/migration • Mortality.	*General Mitigation Measures* • Implementation of the EPP. • Minimize the footprint of physical disturbance to the extent possible. • Avoid disturbing sensitive/significant habitats during construction to the extent possible. • Minimize vegetation clearing, wherever possible. • Prompt restoration of cleared areas post-construction. • Maintain efficient timelines to complete Project activities within the shortest amount of time possible. *Species-specific Mitigation* • The EPP for the Project will require Project personnel to report any Mainland moose sightings to NSDNR. • minimize disturbance to mature forest stands (fisher). • Leave coarse woody debris and standing deadwood intact (fisher). • Avoid disturbance to dispersal corridors, particularly riparian areas (fisher). • Avoid disturbance to talus slope habitat (Long-tailed shrew). • Should large congregations of Monarchs be found at the Project site, Project	Scope: Local Duration: Short-term Frequency: Once Magnitude: Negligible-Low	No residual effect anticipated	Not applicable

Environmental Component	Potential Effect	Mitigation Summary	Significance Criteria	Residual Effects	Significance of Residual Effect
		activities in the area should cease until the migrating group has left the Project site. • Leave adequate, permanent buffers of vegetation around important Wood turtle habitat. • In the event that Wood turtles are confirmed at the site, an appropriate mixture of shrubs and trees will be planted to create a buffer. • Any wood turtles found will be relocated outside of the construction zone (as per guidelines outlined in MacGregor and Elderkin 2003, and NSTPW 2007). • Report any sightings of wood turtle to the NS Wood Turtle Recovery Team (1-866-727-3447.			
Avifauna and Bats	• Habitat loss/Alteration • Mortality • Sensory disturbance.	• Implementation of the EPP. • Conduct vegetation clearing outside of the breeding and nesting season for birds (April to August). • If this is not possible, a mitigation plan will be developed in consultation with NSDNR and CWS prior to clearing activities. • Limit the use of lighting during construction to minimum acceptable levels. • Avoid placement of Project infrastructure in habitats significant to bird and bat	Scope: Local Duration: Short-term Frequency: Once Magnitude: Low	No residual effect anticipated	Not applicable

Environmental Component	Potential Effect	Mitigation Summary	Significance Criteria	Residual Effects	Significance of Residual Effect
		species. These include wetlands, hibernacula, mature forests, land directly adjacent to open water and areas with large, hollow trees.			
Accidents and Malfunctions	• Accidental spill/release. • Failure of erosion and sediment /control measures.	• Implementation of the EPP, including the spill prevention plan and contingency plans (as necessary).	Scope: Local Duration: Short-term Frequency: Once Magnitude: Negligible-Low	No residual effect anticipated	Not applicable

Table 13.5: Environmental Effects Analysis – Operation/Maintenance Phase

Environmental Component	Potential Effect	Mitigation Summary	Significance Criteria	Residual Effects	Significance of Residual Effect
SOCI	• Sensory disturbance • Collision mortality	*General Mitigation Measures* • Implementation of the EPP. • Implementation of Safe Work Practices and strict adherence to speed limits and warning signs to avoid traffic collisions. • Minimize road traffic to the extent possible. • Implement efficient timelines to complete Project activities within the shortest possible time frame. • To the extent possible, plan operation and maintenance activities to avoid sensitive habitats and minimize time on-site.	Scope: Local Duration: Long-term Frequency: Intermittent Magnitude: Negligible	No residual effect anticipated	Not applicable
Avifauna and Bats	• Mortality from collision (avifauna and bats) or barotrauma (bats). • Sensory disturbance.	• Implementation of the EPP. • To the extent possible, plan operation and maintenance activities to minimize time on-site. • Avoid routine vegetation clearing during breeding and nesting season. • Avoid all unnecessary lighting at the Project site. Lighting will only be used when technicians are working on-site.	Scope: Local Duration: Long-term Frequency: Continuous Magnitude: Low	It is expected that birds will avoid the immediate area of the turbines (but not the Project site and surrounding area), which will reduce the number of bird collisions. Bird and bat fatalities due to turbine	Low

Environmental Component	Potential Effect	Mitigation Summary	Significance Criteria	Residual Effects	Significance of Residual Effect
		• Limit lighting on turbine hubs and blades to minimum levels while still meeting requirements of Transport Canada. • Implement post-construction monitoring under direction of NSE and in consultation with CWS and NSDNR to monitor for significant mortality trends.		collisions are not expected to be significant.	
Accidents and Malfunctions	• Accidental release. • Failure of erosion and sediment control measures.	• Implementation of the EPP, including the spill prevention plan and contingency plans (as necessary).	Scope: Local Duration: Short-term Frequency: Once Magnitude: Negligible-Low	No residual effect anticipated	Not applicable

Table 13.6: Environmental Effects Analysis – Decommissioning Phase

Environmental Component	Potential Effect	Mitigation Summary	Significance Criteria	Residual Effects	Significance of Residual Effect
SOCI	• Sensory disturbance. • Habitat alteration and/or degradation. • Mortality.	• Implementation of the EPP. • Minimize of the footprint of physical disturbance to the extent possible. • Avoid disturbing sensitive habitats during decommissioning. • Prompt restoration of cleared areas post-construction. • Maintain efficient timelines to complete Project activities within the shortest amount of time possible. • Limit access to existing roads only. • Avoidance of known significant habitat, where possible.	Scope: Local Duration: Short-term Frequency: Once Magnitude: Negligible	No residual effect anticipated	Not applicable
Avifauna and Bats	• Sensory disturbance.	• Implementation of the EPP • Limit access to existing roads only. • Limit time on site. • Avoid decommissioning activities during breeding/nesting season, to the extent possible. • Restore vegetation promptly following decommissioning. • Limit the use of lighting during decommissioning to minimum acceptable levels	Scope: Local Duration: Short-term Frequency: Once Magnitude: Negligible	No residual effect anticipated	Not applicable

Environmental Component	Potential Effect	Mitigation Summary	Significance Criteria	Residual Effects	Significance of Residual Effect
Accidents and Malfunctions	• Accidental release. • Failure of erosion and sediment control measures.	• Implementation of the EPP, including the spill prevention plan and contingency plans (as necessary).	Scope: Local Duration: Short-term Frequency: Once Magnitude: Negligible-Low	No residual effect anticipated	Not applicable

13.4 Follow-up Measures

A potential residual effect for avifauna and bats was noted in Table 14.5. The potential effect of collisions and/or fatalities to these VECs will be addressed in post-construction monitoring programs that will be implemented to assess the effects of the operation of the proposed wind farm.

14.0 EFFECTS OF THE ENVIRONMENT ON THE PROJECT

Environmental factors that have the potential to have damaging effects on wind turbines include:

- Extreme wind (typically associated with hurricanes);
- Hail;
- Ice storms/ ice formation;
- Heavy snow;
- Lightning; and
- Fire.

The primary mitigative measure employed during the construction and operation of the Project will be to educate and train site personnel. Environmental and safety orientations will be conducted prior to the start of construction and all staff will be informed of the potential effects of the environment on the Project. Staff responsible for the operation and maintenance of the Project will be trained on the design and operation of the turbine, including applicable operating procedures, safety protocols and evacuation plans.

Modern wind turbines are equipped with a number of mechanisms to reduce damage caused by extreme weather and are designed to shut down when certain thresholds are detected (CanWEA 2011). Further, best practices and industry standards will be applied to the operation of the Project to manage risks of damage from extreme events. Table 14.1 demonstrates potential effects resulting from environmental events and the mitigation associated with each.

Table 14.1 Effects of Environmental Events and Associated Mitigation

Event	Environmental Effect	Mitigation
Hurricane/ Extreme winds	Damage to blades	• Turbine design equipped to shut down.
Hail	Damage to blades.	• Turbine maintenance according to best practices and industry standards.
Ice Storms	Ice formation. Potential ice throw.	• Turbine design equipped to shut down. • Appropriate safety protocol. • Restrict use of Project site. • Signage to indicate potential falling ice.
Heavy Snow	Damage to turbines/blades.	• Turbine design equipped to shut down.
Lightning Strike	Potential fire during operation. Damage to electrical systems.	• Turbine design equipped with built-in grounding system. • Appropriate safety protocol.
Fire	Damage to the turbine, forest fire.	• Appropriate safety protocol. • Fire prevention plan. • Evacuation plan. • Local training of first responders.

15.0 CUMULATIVE EFFECTS ASSESSMENT

Concerns are often raised about the long-term changes that may occur not only as a result of a single action but of the combined effects of each successive action on the environment (Hegman *et al.*1999).

The cumulative effects assessment focuses only on adverse effects of the Project remaining after the application of mitigation measures (*i.e*., only residual effects). For this Project, the only VECs identified to have a potential residual effect are avifauna and bats (*i.e*., collision mortality). Therefore, known or anticipated activities within a 20 km radius of the Project site were reviewed to identify the potential for cumulative effects on avifauna and bats.

A search for existing or proposed wind farm developments was completed within the 20 km radius of the Project site. This existing Ellershouse Wind Farm consists of a seven-turbine, 16.4 megawatt (MW) project situated north of the proposed turbine locations. Four of the seven turbines (Phase 1) went into operation in November of 2015 and the remaining three turbines (Phase 2) were added to the Project site in 2016. A 6.0 MW wind project, the Martock Ridge Community Wind Project, is located approximately 6.2 km to the west, which has the potential to act cumulatively with this Project.

Both Projects are of relatively small size, and consist of 14 turbines in total. Additionally, the results of the first year of post-construction avifauna monitoring at the first phase of the Ellershouse Wind Farm (discussed in section 8.7) indicate that operating wind turbines in the Project site area results in avifauna mortality rates that are insignificant; therefore the potential for cumulative effects related to avifauna and bat mortality as a result of both Projects are not considered significant.

16.0 OTHER APPROVALS

In addition to the EA Approval, several other permits and/or approvals may be required prior to the start of construction (Table 16.1).

Table 16.1: Future Approvals

Approval/Notification/Permit Required	**Government Agency**
Municipal	
Large Wind Turbine Development Agreement	Municipality of the District of West Hants
Provincial	
EPP/Sediment and Erosion Control Plan	NSE
Wetland Alteration Approval	NSE
Notification of Blasting (if required)	NSE
Overweight/Special Move Permit	Service Nova Scotia
Access Permit	NSTIR
Work within Highway Right-of-Way	NSTIR
Use of Right-of-Way for Pole Lines	NSTIR
Electricity Standard Approval	NSDE

Approval/Notification/Permit Required	Government Agency
Elevator/Lift License	Nova Scotia Department of Labour and Advanced Education
Federal	
Notification of Project (awaiting response)	RCMP
Aeronautical obstruction clearance	Transport Canada
Lighting design for navigational purposes	Transport Canada
Final design, location and height of turbines	NRCan
EMI consultation (awaiting response)	DND, NAV Canada, Canadian Coast Guard, EC

17.0 CONCLUSIONS

In accordance with "A Proponent's Guide to Wind Power Projects: Guide for Preparing an Environmental Assessment" (NSE 2012a), the studies, regulatory assessments, and VEC evaluations described within this document have been considered both singularly and cumulatively.

The results indicate that there are no significant environmental concerns or impacts that may result from the Project that cannot be effectively mitigated or monitored.

Best practices and standard mitigation methods will be implemented during all phases of the Project, to ensure methods and practices are comprehensive and are adhered to. Furthermore, an EPP will be developed and communicated to all employees working on the Project.

The proposed capacity of the turbines will produce enough energy to power 4,500 households and will contribute to reaching Nova Scotia's renewable energy commitments.

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APPENDIX A
MUNICIPALITY OF WEST HANTS
MUNICIPAL PLANNING STRATEGY AND BY LAW

1.0 BACKGROUND

The Municipality of the District of West Hants is a primarily rural municipality bordered by the Municipalities of East Hants, Kings, Chester, the Halifax Regional Municipality and the Town of Hantsport. Development is concentrated around the Town of Windsor in Three Mile Plains and Falmouth, and in communities near Highway 101. The "Municipality of the District of West Hants Municipal Planning Strategy" (the Strategy) provides the framework to guide growth and development in West Hants. The Strategy sets out Council's intentions for future development and provides criteria for Council and planning staff to consider in evaluating development proposals. Together with the "Land Use By-law" and the "Subdivision By-law", the Strategy controls future land use and development in West Hants. The Strategy may be amended to accommodate changing conditions and must be reviewed from time to time to ensure that the policies meet the changing needs of the Municipality.

Based on the Strategy the proposed Project would be considered a "Large Wind Farm". It is the policy of Council to consider the development of permanent or long-term installations of large wind turbines or wind farms outside the Growth Centre, Village and Hamlet designations through development agreement (Municipality of West Hants 2008a).

The Municipal Zoning Maps (Schedule A) provided in support of the Strategy and By-law indicate that the Project site falls in a "General Resource" zone, which permits wind energy facilities, subject to a Development Agreement, as well as several setbacks and guidelines as outlined in the Strategy and By-law. Application for a Development Agreement is made to the Municipality through the West Hants Municipal Office (or the Planning Department). The Planning Department prepares a report on the application for the Planning Advisory Committee (PAC), the committee of Council which considers planning matters. The PAC will review the application and report to ensure the proposed development complies with the policies of the Strategy and the Land Use By-law. The PAC meets once per month to review such proposals.

The following sections provide an overview of the policies outlined in the Strategy and By-law, which are applicable to the proposed Project, and should not be considered a substitute for the full text versions of these documents.

2.0 MUNICIPAL PLANNING STRATEGY POLICIES FOR WIND TURBINES

Section 4.22: Wind Turbines

Council wishes to encourage the use of technologies that reduce dependence on non-renewable resources and do not contribute to greenhouse gas emissions. Wind energy systems are a clean, renewable source of electric power. Residential-scale wind turbines will be permitted in most zones, subject to lot size, setback, and height requirements.

Utility-scale wind turbines have a rated production capacity greater than 100 kW. Much larger than those used for residential energy generation, utility-scale turbines may have towers ranging from 165 to 400 feet (50 to 120 m) in height. These large wind turbines may be used in wind farms, where a

number of turbines feed electricity directly into the utility grid, or as stand-alone installations. As Council wishes to facilitate the development of wind energy systems, the installation of exploration or test turbines will be treated as a temporary use and permitted as-of-right outside of the Growth Centres, Village and Hamlets subject to setbacks, minimum lot size standards, and requirements for removal within specified time limits. More permanent installations, including the establishment of wind farms, will be considered only by development agreement. Where these facilities have a production rating of two megawatts or more, they are also subject to the Nova Scotia Environmental Assessment Regulations as a Class I Undertaking. Most wind farms also require a federal Environmental Assessment under the Canadian Environmental Assessment Act.

Policy 4.22.1
It shall be the intention of Council to include provisions in the Land Use By-law distinguishing between small wind turbines for residential or small business use, which are intended primarily to reduce on-site consumption of utility power, and large or utility-scale wind turbines with a production capacity greater than 100 kW.

Policy 4.22.2
It shall be the intention of Council to include standards in the Land Use By-law for the development of small wind turbines including minimum lot size, setback, height and similar requirements to ensure public safety and minimize the potential for land use conflicts.

Policy 4.22.3
It shall be the intention of Council to include standards in the Land Use By-law for the temporary establishment of large wind turbines for exploration or test purposes outside the Growth Centre, Village and Hamlet designations, including requirements for removal within specified time limits.

Policy 4.22.4
It shall be the policy of Council to consider the development of permanent or long-term installations of large wind turbines or wind farms outside the Growth Centre, Village and Hamlet designations by development agreement, having regard to the following:

(a) any required provincial and/or federal government environmental assessment processes have been completed;
(b) adequate separation distances are maintained from adjacent land uses to minimize impacts of noise and shadow and to ensure public safety;
(c) the development is not visually intrusive in the landscape, taking into account the location and distance from which it is visible, and the significance and sensitivity of the landscape, topography, vegetation and built form in the surrounding area;
(d) safe roadway access can be provided;
(e) any other matter which may be addressed in a development agreement; and
(f) Policy 16.3.1.

<u>Section 16.3: Land Use By-law Amendments and Development Agreements</u>
Changes to the Land Use By-law-whether map amendments (rezoning) or text amendments-may be considered by Council provided they are in conformity with the Municipal Planning Strategy.

Should Council consider amending the Land Use By-law, it must fully examine the implications of the change and the amendment must comply with all other legal requirements as set out in the Municipal Government Act.

A development agreement is a legal agreement between Council and a property owner. In such agreements, a wide range of factors may be addressed that go beyond what may be considered under standard zoning. Development agreements provide an opportunity for Council to exercise a greater degree of control over many aspects of a development proposal such as use, design, architectural detail, hours of operation and other matters of concern to adjacent landowners. Development agreements also can provide a greater degree of flexibility to the developer. A development agreement is binding upon a property until the agreement is discharged by Council.

Policy 16.3.1
In considering development agreements and amendments to the West Hants Land Use By-law, in addition to the criteria set out in various policies of this Strategy, Council shall consider:

(a) whether the proposal is considered premature or inappropriate in terms of:
  (i) the adequacy of sewer and water services;
  (ii) the adequacy of school facilities;
  (iii) the adequacy of fire protection;
  (iv) the adequacy of road networks adjacent to, or leading to the development; and
  (v) the financial capacity of the Municipality to absorb any costs relating to the development.
(b) whether the development is serviced, or capable of being serviced, by a potable water supply and either central sewer or an approved on-site sewage disposal system;
(c) the suitability with any aspect relative to the movement of auto, rail and pedestrian traffic;
(d) the adequacy of the dimensions and shape of the lot for the intended use;
(e) the pattern of development which the proposal might create;
(f) the suitability of the area in terms of steepness of grade, soil and geological conditions, location of water courses or wetlands, and susceptibility of flooding;
(g) whether the proposal meets the requirements of the appropriate provincial or federal agencies as well as whether it conforms to all other relevant municipal by-laws and regulations; and
(h) any other matter required by relevant policies of this Strategy.

Source: Municipality of West Hants, 2008a.

3.0 OVERVIEW OF LAND-USE BY-LAW

The following is an overview of the regulations in the By-law that, along with the General Provisions and Zoning boundaries, are directly applicable to the proposed Project.

Section 2.0 Administration

2.1 Administration

This By-law shall be administered by the Development Officer appointed by Council.

2.2 Inspection

The Council, by any duly authorized officer or servant, shall have the right to enter at all reasonable times into or upon any property within the Municipality for the purpose of an inspection necessary in connection with the administration of this By-law.

2.3 Licenses, Permits, and Compliance with Other By-laws

(a) Nothing in this By-law shall exempt any person from complying with the requirements of any other By-law of the Municipality or from obtaining any license, permission, permit, authority or approval required by any other By-law of the Municipality or any act or regulation of the Province of Nova Scotia or the Government of Canada.

(b) Where the provisions of this By-law conflict with those of any other By-law of the Municipality or any act or regulation of the Province or the Government of Canada, the higher or more stringent provision shall prevail.

2.4 Development Permit

(a) Unless otherwise stated in this By-law, no person shall use any land or erect, alter or use any building or structure in the Municipality without first obtaining a development permit from the Development Officer.

(b) The Development Officer shall only issue a development permit in conformance with this By-law or a duly executed and approved development agreement.

(c) A development permit issued after the coming into force of this By-law shall automatically expire 12 months from the date issued if the development has not commenced. A development permit issued before the coming into force of this By-law shall automatically expire 12 months from the effective date of this By-law if the development has not commenced.

(d) The Development Officer may revoke a development permit where information provided on the application is found to be inaccurate.

2.6 Application for a Development Permit

(a) Every application for a development permit shall be accompanied by a sketch or plan drawn to an appropriate scale and showing:

(i) the shape and dimensions of the lot to be used;

(ii) the dimensions and height of the building or structure proposed to be erected and its distance from the lot boundaries;

(iii) the distance from the lot boundaries and size of every building or structure already erected on the lot; and

(iv) the proposed location and dimensions of any parking space, loading space, driveway, and landscaped area.

(b) In addition to the requirements of subsection (a), every application for a development permit shall show:

(i) the existing and proposed use of the lot and any building or structure; and
(ii) any other information the Development Officer deems necessary to determine whether or not the proposed development conforms to the requirements of this By-law.

(c) Where the Development Officer is unable to determine whether the proposed development conforms to this By-law, the Development Officer may require that the plans submitted under subsection (a) be based upon a survey certified and stamped by a Nova Scotia Land Surveyor.

2.7 Signature of Applicant

The application for a development permit shall be signed by the registered owner of the lot or by the owner's agent duly authorized in writing to act for the owner.

2.8 Advertising and Notification Costs

(a) Where an application is made to amend this By-law or to enter into or amend a development agreement, the applicant shall deposit with the Municipal Clerk at the time of application an amount estimated by the Municipal Clerk to be sufficient to pay the costs of any advertising and notification required.

(b) If the amount paid under subsection (a) is not sufficient to cover the actual costs incurred, the applicant shall pay the additional amount required within 30 days of remittance of an invoice. If the amount paid exceeds the actual costs incurred, the Municipal Clerk shall refund the excess amount.

2.9 Notice to Property Owners

(a) When an application has been received to amend this By-law for a site-specific purpose, enter into a development agreement, or amend a development agreement, all property owners within 300 ft (91.44 m) of the subject property shall be notified of the application by the Municipal Clerk.

(b) The notice referred to in subsection (a) shall be in addition to the advertisement for public hearing required under the Municipal Government Act and shall be delivered, by regular mail prior to the public hearing, to all assessed property owners as shown on the current assessment roll in use by the Municipality at the time of the notification.

2.10 Effective Date

(a) This By-law shall take effect upon the date of publication of the notice advertising the approval of the new By-law.

(b) The adoption of this By-law repeals any previous Land Use By-laws adopted by the Municipality.

<u>Wind Turbines</u>

5.51

Small wind turbines shall be permitted subject to the following:

(a) not more than one turbine shall be permitted per lot except where the lot is at least 2

acres (0.81 ha) in area;
(b) turbines with towers under 50 ft (15.24 m) in height shall be permitted in any zone provided the lot is at least 0.5 acres (0.20 ha) in area;
(c) turbines with towers 50 ft (15.24 m) in height or greater shall be permitted only in zones outside the Growth Centre designation provided the lot is at least 1 acre (0.40 ha) in area;
(d) the minimum setback from any lot line for the tower shall be the greater of:
(i) the minimum yard requirement for a main building; or
(ii) the height of the tower plus the distance from the top of the tower to the highest extended tip of the rotor blades;
(e) the minimum setback for the tower from any dwelling on the same lot shall be the height of the tower plus the distance from the top of the tower to the highest extended tip of the rotor blades;
(f) the minimum setback for the tower from any dwelling on an adjacent lot shall be 200 ft (60.96 m);
(g) no ladder or permanent tower access device shall be located less than 12 ft (3.66 m) above grade;
(h) there shall be no restriction on the height of the tower provided the property owner has received Aeronautical Clearance approval from Transport Canada.

5.52
For the purposes of Section 5.51 (b) and (c), height shall be measured as the distance above grade of the fixed portion of the tower, excluding the wind turbine itself.

5.53
The erection of a single large wind turbine for exploration or test purposes shall be permitted subject to the following:
(a) the turbine shall not remain in place for more than two years;
(b) turbines shall be permitted only in zones outside the Growth Centre, Village and Hamlet designations provided the lot is at least 10 acres (4.05 ha) in area; and
(c) the requirements of Section 5.51 (d), (e), (f) and (g).

<u>Section 6.0: Development Agreements</u>

6.1 Developments to be considered by Development Agreement
The following developments may be considered only by development agreement in accordance with the Municipal Government Act and the Municipal Planning Strategy:

General
(x) institutional uses in any designation in accordance with Policy 13.1.2 of the Municipal Planning Strategy;
(y) Recreation Commercial uses in any designation, except the Village Core, in accordance with Policy 13.3.2 of the Municipal Planning Strategy;
(z) non-conforming uses in accordance with Policy 16.8.2 of the Municipal Planning Strategy; and

(aa) permanent or long-term installations of large wind turbines or wind farms outside the Growth Centre, Village and Hamlet designations in accordance with Policy 4.22.4 of the Municipal Planning Strategy.

Section 35: Definitions

Wind Farm means an array of two or more large wind turbines connected directly to the utility grid;
Wind Turbine includes a windmill used for pumping water and a wind energy conversion system consisting of a wind turbine, a tower and associated control or conversion electronics;
(a) ***Small Wind Turbine*** means a wind turbine which has a rated capacity of not more than 100 kW and which is intended primarily to reduce on-site consumption of utility power;
(b) ***Large Wind Turbine*** means a wind turbine with a production capacity greater than 100 kW;

Source: Municipality of the District of West Hants, 2008b.

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APPENDIX B
ENVIRONMENTAL PROTECTION PLAN
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APPENDIX C
HUMAN HEALTH AND WIND FARMS – A LITERATURE REVIEW

In support of the Environmental Assessment (EA) for the Ellershouse Wind Farm Expansion, a review was completed of current available literature on the potential effects on human health related to wind energy. Several key health-related issues were identified, and Project-specific studies were completed to address shadow flicker and (audible) sound. Details of these studies are provided in Section 11.0 of the "Environmental Assessment Registration Document".

The following sections provide additional background information on the potential effects of electromagnetic fields (EMFs), air quality, ice throw/shedding and infrasound on human health.

Electromagnetic Fields

Electromagnetic fields (EMFs) are a type of energy that occurs naturally and is also created through the use of electrical appliances and equipment (i.e. cell phone usage, radio towers, etc.) (City of Toronto 2011). EMFs are not unique to wind energy projects; EMF is part of our modern lives. Health Canada has stated that while there may be health concerns associated with low levels of EMF, use of electricity and electrical appliances exposes residents constantly to EMFs at extremely low frequencies (Rod and Heiger-Bernays 2012). A guidebook to Wind Energy Development was produced in 2011 and identified transmission lines, wind turbine generators, generator transformers and underground cables as the four potential sources of EMFs as a result of wind farm operations (Canadian Wind Energy Association [CanWEA] 2011). The guidebook goes on to suggest that EMF exposure is not significant due to low emission levels produced by wind farm operations and indicates that generator transformers likely generate the highest levels of EMFs. Similar conclusions have been made by Health Canada and the World Health Organization (Chief Medical Officer of Health of Ontario 2010).

In 2007, a study was completed to assess the possible effects of EMFs on human health. The study concluded that there is little evidence to support the theory that EMFs cause long term health issues (Scientific Committee on Emerging and Newly Identified Health Risks 2007). As well, a study led by the National Institute of Environmental Health Sciences assessed scientific evidence spanning over six years, to determine whether exposure to EMF could result in a potential risk to human health. Results indicated that there were no consistent patterns of biological effects with animals or with cells (Electric and Magnetic Fields Research and Public Information Dissemination Program 2002). A recent study was carried out at the Kingsbridge 1 Wind Farm in Ontario, involved the collection of magnetic field measurements in the proximity of 15 Vestas 1.8 MW wind turbines, two substations, various buried and overhead collector and transmission lines, and nearby homes (McCallum et al. 2014). Data was gathered during three operational scenarios to characterize potential EMF exposure: 'high wind' (generating power), 'low wind' (drawing power from the grid, but not generating power) and 'shut off' (neither drawing, nor generating power). Results suggest that there is nothing unique to wind farms with respect to EMF exposure; in fact, magnetic field levels in the vicinity of wind turbines were lower than those produced by many common household electrical devices and were well below any existing regulatory guidelines with respect to human health (McCallum et al. 2014).

Health Canada states that "research has shown that EMFs from electrical devices and power lines can cause weak electric currents to flow through the human body. However, these currents are

much smaller than those produced naturally by your brain, nerves and heart, and are not associated with any known health risks" (Health Canada 2010). Health Canada goes on to state that EMFs are strongest when close to the source so that at greater distances, the strength of the field fades rapidly and humans need not engage in specific actions to minimize risk including those who are located just outside the boundaries of power line corridors (Health Canada 2010).

Air Quality

The development and construction phases of a wind energy project may affect local air quality by increasing air borne dust associated with on-site equipment, and vehicles. Emissions from vehicles and equipment can also contribute to a reduction in local air quality.

The American Wind Energy Association (AWEA) states that the generation of electricity from the wind does not result in any air emissions (AWEA 2010). Similarly, the US Environmental Protection Agency (EPA) recognizes that the emissions associated with wind technology are negligible because no fuels are combusted. Therefore, wind energy production offsets more polluting forms of energy generation and can actually improve air quality and our health.

Ice Throw and Ice Shedding

Under appropriate temperature and humidity conditions, ice can build up on the rotor blades, nacelle and tower of a wind turbine, which can lead to two types of risk:

- ice fragments dislodge and are shed from the rotor of the operating turbine due to aerodynamic and centrifugal forces; and
- ice fragments dislodge from the structure and fall to the ground when it is shut down or idling without power production (CanWEA 2007).

Typically, modern wind turbines are equipped with mechanisms which shut down turbines when sufficient ice formed on the blades is detected by ice or vibrational sensors. Ice will most often fall from a turbine when it is stationary, because during an extreme weather event with very high winds, the turbine blades will be shut off. Ice throw from an operational blade would typically occur during start up when rotational speeds are low or if a failure of the control system occurs (Rod and Heiger-Bernays 2012).

The Massachusetts Department of Environmental Protection in collaboration with the Massachusetts Department of Public Health (Ellenbogen *et al*. 2012) recently convened a panel of independent experts to identify any documented or potential health impacts of risks that may be associated with exposure to wind turbines, and, specifically, to facilitate discussion of wind turbines and public health based on scientific findings. The Massachusetts Panel did a thorough review of risk from ice throw in 2012, which included analysis of the physics of ice throw to ascertain probable distance and comparison with a study completed in Finland from 2003 (Rod and Heiger-Bernays 2012). The Finnish study included a database review of recorded ice throw from wind turbines, which determined that recorded distances are typically less than 125 m from the base of the turbine (Seifert *et al.* 2003, as cited in Rod and Heiger-Bernays 2012). The Massachusetts Panel identified a simplified formula for calculating maximum ice throw operating turbine without ice control

measures based on blade radius and hub height of a turbine. For a typical turbine, with a hub height of 80 m and blade radius of 40 m, the maximum distance of ice throw is 240 m (Ellenbogen *et al.* 2012, as cited in Rod and Heiger-Bernays 2012).

As part of a project prepared by the Finnish Meteorological Institute entitled "Wind Energy in Cold Climates (WECO)", a set of safety guidelines for wind developments in ice prone areas was developed. A risk assessment methodology demonstrated that the risk of being struck by ice thrown from a turbine is diminishingly small at distances greater than approximately 250 m from the turbine in a climate where moderate icing occurs (Morgan *et al*. 1998). With proper setbacks and on-sight safety awareness, hazards are minimized (Colby 2008; Ellenbogen *et al*. 2012).

In 2007, Garrad Hassan was commissioned by the CanWEA to develop a risk assessment for ice throw from an operating turbine from perspective of public safety. The model employed for the assessment was based on a large-scale wind turbine with a hub height of 80 m and rotor diameter of 80 m. The model result was a distance of 220 m for critical ice shed and that beyond 220 m, there is negligible risk of injury from ice throw. For ice shed from a non-operational turbine, the distance is typically under 50 m from turbine base (Hassan 2007, as cited in Rod and Heiger-Bernays 2012).

All sources reviewed by Rod and Heiger-Bernays (2012) in support of the 2012 Kings County review arrive at similar conclusions on safe distances with regards to ice throw. All conclude that risk is only present in relatively close proximity to the turbine during icing conditions.

Turbines for the proposed Project have been located over 870 m from the nearest permanent/ seasonal residence. Access to the site is provided initially by Hartville and Ellershouse roads which are paved public roads, and then via Hartville Quarry Road, a gravel road providing access to Hartville Quarry and the existing Ellershouse Wind Farm. The public road in closest proximity to a proposed turbine is Salmon Hole Dam Road, which is approximately 885 m north of Turbine 9, therefore there is little to no risk associated with ice throw to the public using these roads. However, logging roads and trails exist throughout the site, which are frequently used by recreationists for snowmobiling, hunting, and ATVing. The Project team is currently engaging with recreational groups and with the project insurer to determine a solution that would ensure continued safe use of the site by the various groups.

Turbine access roads are expected to be gated and used by on-site workers only for safety reasons, which will decrease the risk of injury from ice to nearby workers and recreationists. In addition, the following additional mitigation strategies can be implemented to lower or remove the risk of ice throw to persons at the site:

- physical and visual warnings (i.e. signs and fences) posted in proximity to turbines to warn individuals of the risk of ice shed and ice throw;
- restrict operational activities in the vicinity of the turbines during and immediately following an icing event;
- employ turbine deactivation mechanisms during periods of ice accumulation; and
- train operational staff of the risks associated with ice during certain conditions and restrict site access to trained site personnel (Rod and Heiger-Bernays 2012; Wahl and Giguere 2006).

Infrasound

General Background - Sound

Humans detect sound from changes in pressure that travel through the air and cause the eardrum and small bones of the middle ear to vibrate. The vibrations are transmitted to the inner ear where sensory hair cells then change the vibrations into nerve impulses, which travel to the brain where they are perceived and interpreted.

The magnitude (loudness) of sound is described as "pressure level", "sound level" or "noise level" and is measured as decibels (dB). Typical sound levels, measured in decibels, are shown in Table A.

Table A: Typical Sound Levels

Source	Distance from Source		Sound Pressure Levels (dBA)
	feet	meters	
Freight train	100	30	70
Vacuum Cleaner	10	3	70
Freeway	100	30	70
Wind in trees	40	12	55
Light traffic	100	30	70
Average home			50
Soft whisper	5	2	30
Quiet bedroom			20

Source: AWEA 2010

The tonal quality or pitch of the sound is related to its frequency and is measure in hertz (Hz). The normal frequency range of sounds that humans can hear (known as audible sound) extends from about 20-50 Hz (a rumbling sound) up to high frequency of about 10,000-15,000 Hz (hissing sound) or even higher for some people. Humans generally hear best in the mid-frequency range of 500-4,000 Hz.

General Background - Infrasound

Infrasound is very low-frequency sound, that is typically defined as being between 1-20 Hz, which is below what human ears can normally hear. The impulsive noises that are described anecdotally as the "swish" and "thump" sounds from a wind turbine are broadband sounds that fall within the audible range and are not infrasound by definition (Rod and Heiger-Bernays 2012).

Infrasound is everywhere in the environment. It is emitted from natural sources (e.g. wind, rivers) and from artificial sources including road traffic, aircraft, and ventilation systems. The most common source of infrasound that humans encounter is vehicles (CMOH 2010). Like audible noise, ILFN from large-scale wind turbines attenuates over space as a function of site-specific characteristics (*i.e.,* ground conditions, topography, vegetation), as well as climatic conditions (Rod and Heiger-Bernays 2012).

When evaluating potential effects of infrasound, it is important that these frequencies be discussed in the context of the sound pressure levels, or in other words, the loudness of the sound. For instance, very loud sounds at very low frequencies (i.e. 165 dB at 2 Hz, reducing to 145 dB at 20 Hz)

may result in pain (Leventhall 2006) and infrasound has been shown to cause annoyance, when the sound level exceeds the threshold of hearing (i.e. the lowest sound levels that a listener can detect) (HGC 2010). Further, research shows that to be physically felt, infrasound must exceed 100–110 dB (Ellenbogen *et al*. 2012).

While there is some variation in the literature and between individual sensitivities, there is fairly good agreement on the level of the threshold of hearing among the various studies that have been completed (Figure 1).

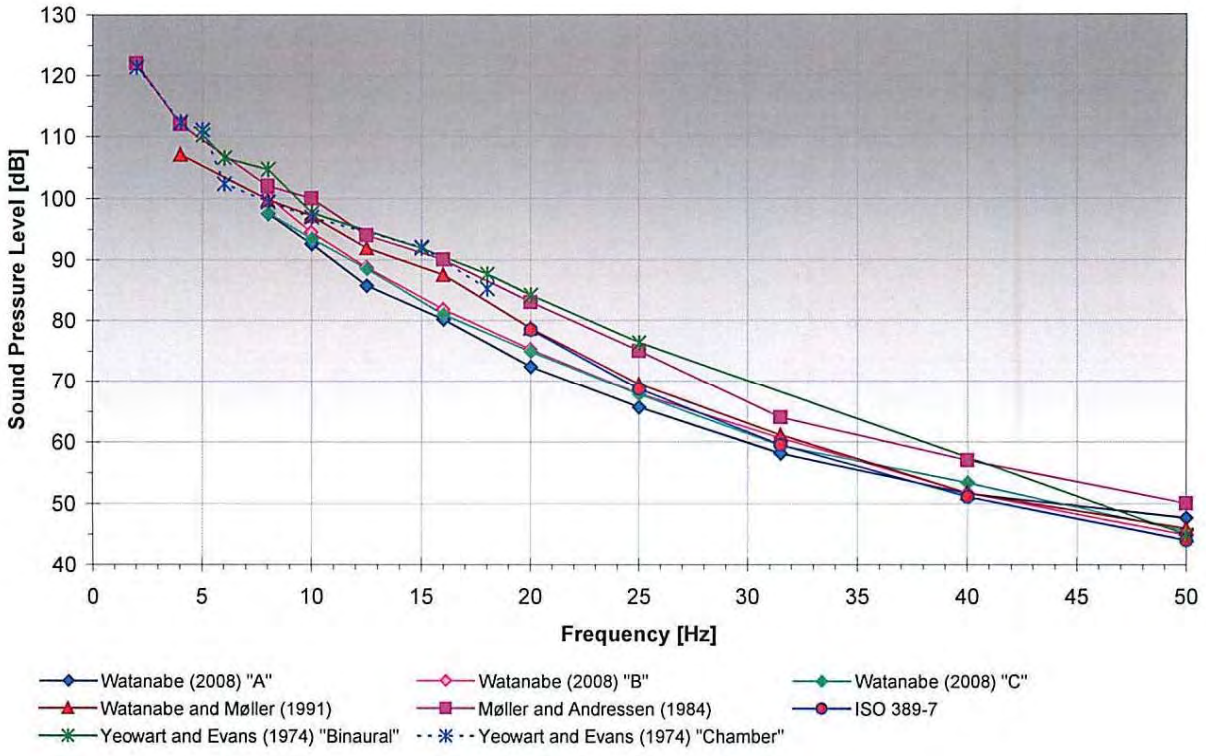


Figure 1: Threshold of Hearing Data from Various Papers (HGC 2010).

What these results show is that the lower the frequency of the sound, the louder the sound needs to be in order to be perceived.

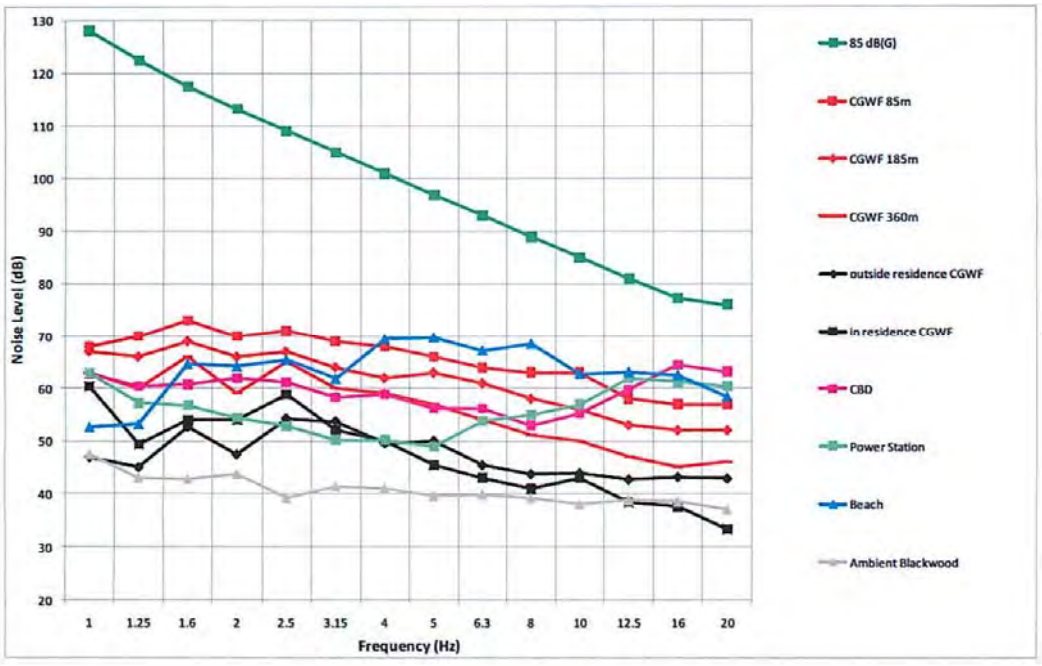
Measured Infrasound Levels

In 2010, Sonus, an acoustic consulting firm based in South Australia, completed a study to measure infrasound produced by a range of natural and manmade sources using a methodology specifically designed to measure infrasound (Table B, Figure 2). The G-weighting network was applied to the measured infrasound pressure levels as it has been standardized to determine the human perception (i.e. threshold of hearing) and annoyance due to noise that lies within the infrasound frequency range. By comparison, when measuring audible sound levels, meters are usually equipped with weighting circuits to simulate the frequency response characteristics of the human ear. The A-weighting filter is normally used as it correlates well with the human perception of most

sounds. Sound levels measured using the G and A-weighting filters are expressed as dBG and dBA, respectively.

Table B: Measured Levels of Infrasound from Natural and Manmade Sources

Source	Infrasound Level (dBG)
Threshold of hearing	85 dBG
Wind Farm (360 m downwind) (CGWF)	61 dBG
100 m downwind from wind farm (CBWF)	66 dBG
200 m downwind from wind farm (CBWF)	63 dBG
Ambient infrasound (100 m from nearest turbine with negligible wind and no turbine operation) (CBWF)	62 dBG
Inside a residence (fridge operating) (1200m from nearest turbine)	51 dBG
Outside a residence (1200m from nearest turbine)	58 dBG
Adjacent to the beach (25 m from high water mark)	75 dBG
Cliff face (250 m from the coastline)	69 dBG
Inland forest (8 km from the coastline)	57 dBG
Gas fired power station (350 m)	74 dBG
Business District (70 m from two major road corridors)	76 dBG



Source: Sonus Pty Ltd 2010

Figure 2: Summary of Measurement at the Clements Gap Wind Farm and Other Sources (Sonus Pty Ltd 2010)

The results of the study indicate that while turbines do produce infrasound, levels are well below established levels that can be perceived by humans and are comparable to natural and urban sources that are common in the environment.

Another recent Australian report also measured levels of infrasound within typical environments in South Australia, with a particular focus on comparing wind farm environments to urban and rural

environments away from wind farms. The study concluded that measured infrasound levels at rural locations both near to and away from wind farms were no higher than infrasound levels measured at the urban locations (Figure 3). Human activity and traffic were the main sources of infrasound at urban locations, while localized wind conditions were found to be the main source of infrasound in rural locations. All measurements were below the levels that can be perceived by humans, with most by a significant margin (Evans *et al*. 2013).

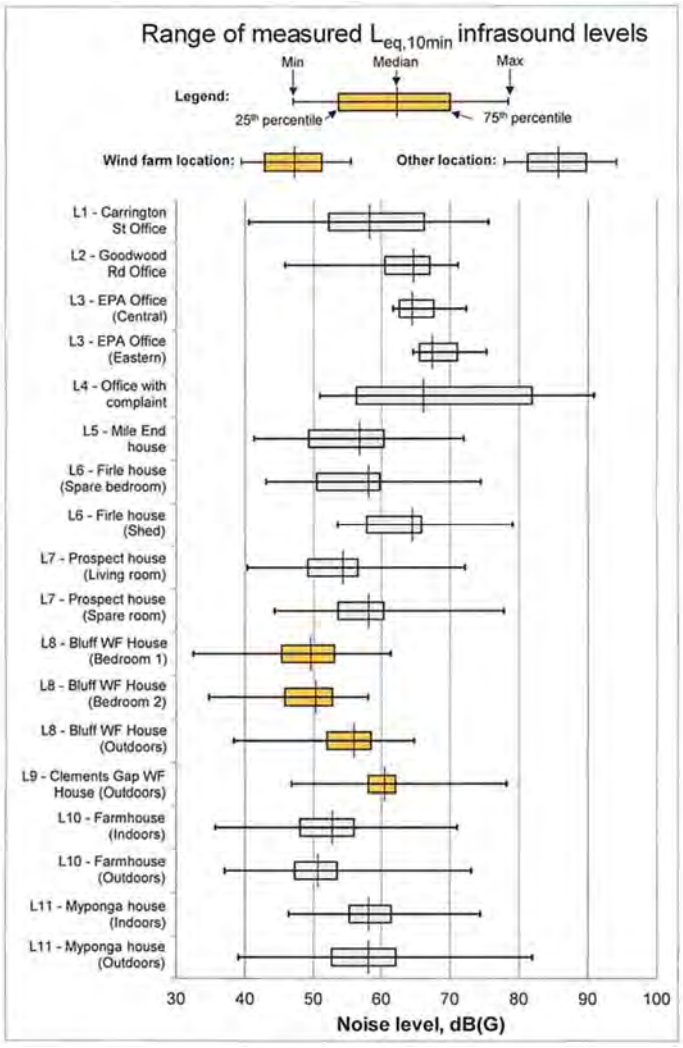


Figure 3: Range of Measured Infrasound Levels (Evans *et al*. 2013).

An investigation was also completed at a wind farm in Pubnico, Nova Scotia to, in part, evaluate infrasound levels at a residence within 330 m of the closest turbine (HGC 2006). Similar to other results from wind farms, infrasound levels were found to be well below the level of sound that can be perceived by humans, as shown in Figure 4.

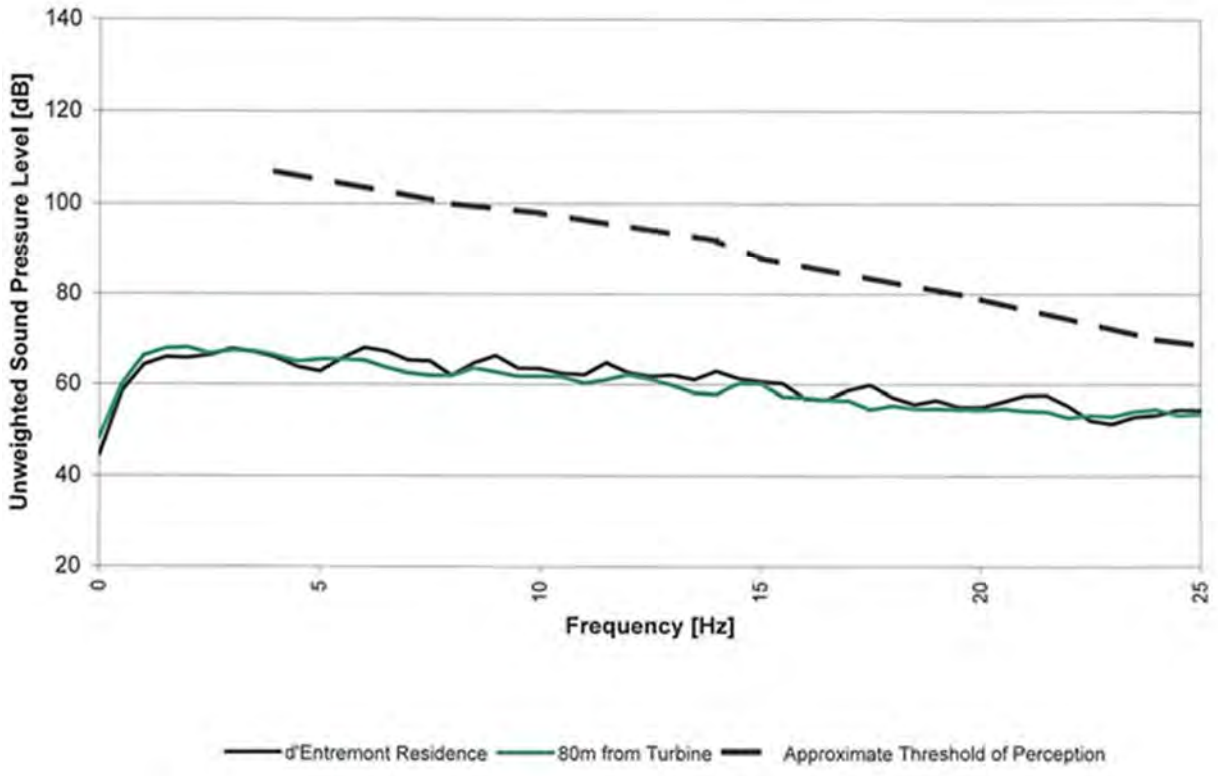


Figure 4: Infrasound Measurements at Pubnico Wind Farm (HGC 2006).

Infrasound and Health Concerns

Concern about infrasound from wind turbines may have originated from the experience of neighbours of early wind turbine designs with downwind rotors (rotors downwind of the tower). In contrast, all modern utility scale wind turbines have upwind rotors that produce significantly lower infrasound emissions (Bastasch *et al*. 2006).

Several studies and panels have been assembled to evaluate the perceived health effects associated with wind turbines.

A scientific advisory panel with expertise in audiology, acoustics, occupational/environmental medicine, and public health was assembled by the wind industry in early 2009 to conduct a review of current literature available on the issue of perceived health effects of wind turbines (Colby *et al*. 2009). Following their review and analysis of the information, the panel reached consensus on the following conclusions:

- There is no evidence that the audible or sub-audible sounds emitted by wind turbines have any direct adverse physiological effects.
- The ground-borne vibrations from wind turbines are too weak to be detected by, or to affect, humans.
- The sounds emitted by wind turbines are not unique. There is no reason to believe, based on the levels and frequencies of the sounds and the panel's experience with sound

exposures in occupational settings, that the sounds from wind turbines could plausibly have direct adverse health consequences.

The Chief Medical Officer of Health in Ontario also conducted a review of papers and reports (from 1970 to date) on wind turbines and health from scientific bibliographic databases, grey literature, and from a structured Internet search. The report concluded that "low frequency sound and infrasound from current generation upwind model turbines are well below the pressure sound levels at which known health effects occur. Further, there is no scientific evidence to date that vibration from low frequency wind turbine noise causes adverse health effects" (CMOH 2010).

The Massachusetts panel concluded that "measured levels of infrasound produced by modern upwind wind turbines at distances as close as 68 m are well below that required for non-auditory perception". Further, the panel concluded that "the weight of the evidence suggests no association between noise from wind turbines and measures of psychological distress or mental health problems" (Ellenbogan *et al*. 2012).

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APPENDIX D
WETLAND METHODOLOGY AND FIELD DATA TABLES

WETLAND ID	WETLAND TYPE	LANDSCAPE POSITION	LANDFORM	WATER FLOW	SOIL TYPE	SURFACE/HYDROLOGIC CONDITIONS	WETLAND BOUNDARY	DOMINANT VEGETATION		
								Herbs	Shrubs	Trees
Wetland 1	Treed Swamp	Terrene	Basin	Ephemeral Throughflow	A1 Histosol	Drainage Channels Water Stained Leaves Sparcely Vegetated Concave Surface	Gentle	Frindged sedge; Cinnamon fern	Speckled alder; Balsam fir	Balsam fir; Red maple
Wetland 2	Treed Swamp	Terrene	Basin	Ephemeral Throughflow	A1 Histosol	Drainage Channels Water Stained Leaves Sparcely Vegetated Concave Surface	Gentle	Fringed sedge; Cattail; Sensitive fern;	Speckled alder;	Red Maple; Balsam Fir
Wetland 3	Treed Swamp	Terrene	Basin	Ephemeral Throughflow	A1 Histosol	Drainage Channels Saturated Soil Surface Water Stained Leaves	Gentle	Cinnamon fern; Sensitive fern; Fringed sedge	Speckled alder; Mountain holly; Balsam fir	Balsam fir; Black spruce; Red maple
Wetland 4	Treed Swamp	Terrene	Basin	Ephemeral Throughflow	A1 Histosol	Drainage Channels Saturated Soil Surface Water Stained Leaves Sparcely Vegetated Concave Surface	Gentle	Fringed sedge; Sensitive fern; Cinnamon fern	Balsam fir; Yellow birch; Speckled alder	Balsam fir; Red maple
Wetland 5	Treed Swamp	Terrene	Basin	Ephemeral Throughflow	A1 Histosol	Drainage Channels Saturated Soil Surface Water Stained Leaves Sparcely Vegetated Concave Surface	Gentle	Fringed sedge; Sensitive fern; Cinnamon fern	Balsam fir; Yellow birch; Speckled alder	Red Maple; Balsam Fir; White Ash

Wetlands and Watercourses in Nova Scotia

Wetlands in Nova Scotia are regulated by NSE under Section 105 of the *Environment Act*. Under the Act, wetlands are:

> *Land referred to as a marsh, swamp, fen, or bog that either periodically or permanently has water table at, near, or above the land surface or that is saturated with water, and sustains aquatic processes as indicated by the presence of poorly drained soils, hydrophytic vegetation, and biological activities adapted to wet conditions.*

Watercourses are defined in the *Environment Act* as:

> *Any creek, brook, stream, river, lake, pond, spring, lagoon, or any other natural body of water, and includes all the water in it, and also the bed and the shore (whether there is actually any water in it or not). It also includes all groundwater.*

Watercourses are defined in Halifax Regional Municipality (HRM) land use by-laws as:

> *A lake, river, stream, ocean, or other natural body of water.*

Delineation Methodology

In order for a wetland determination to be made, the following three criteria were assessed the field:

- Presence of hydrophytic (water loving) vegetation;
- Presence of hydrologic conditions that result in periods of flooding, ponding, or saturation during the growing season; and
- Presence of hydric soils (anaerobic conditions in upper part).

Although detailed data point analysis was not completed within the study areas, soil pits were completed frequently to confirm the presence/absence of wetland hydrology and hydric soils, as per the methodology below. A general vegetation survey was also completed within the wetlands to confirm hydrophytic vegetation.

<u>Identification of Hydrophytic Vegetation</u>
Hydrophytic vegetation is defined as the sum total of macrophytic plant life that occurs in areas where the frequency and duration of inundation or soil saturation produce permanent or periodically saturated soils of sufficient duration to exert a controlling influence on the plant species present (Environmental Laboratory 1987). Hydrophytic vegetation should be the dominant plant type in wetland habitat (Environmental Laboratory 1987).

Dominant plant species observed in each wetland were classified according to indicator status (probability of occurrence in wetlands), in accordance with the U.S. Fish and Wildlife Service (USFWS) National List of Vascular Plant Species that Occur in Wetlands: NE Region (Region 1) (Reed 1988). Please refer to Table 1 (below) for these classifications. These indicators are used as this region most closely resembles the flora of Nova Scotia and climate regime. Further relevant information was reviewed in Flora of Nova Scotia (Zinck, 1998).

Table 1: Classification of Wetland-Associated Plant Species[1]

Plant Species Classification	Abbreviation[2]	Probability of Occurring in Wetland
Obligate	OBL	>99%
Facultative Wetland	FACW	66-99%
Facultative	FAC	33-66%
Facultative Upland	FACU	1-33%
Upland	UPL	<1%
No indicator status	NI	Insufficient information to determine status
Plants That Are Not Listed (assumed upland species)	NL	Does not occur in wetlands in any region.

[1] Source: Reed 1988

[2] A '+' or '–' symbol can be added to the classification to indicate greater or lesser probability, respectively, of occurrence in a wetland.

If the majority (greater than 50%) of the dominant vegetation at a data point is classified as obligate (OBL), facultative wetland (FACW), or facultative (FAC), then the location of the data point is considered to be dominated by hydrophytic vegetation.

Identification of Hydric Soils

A hydric soil is a soil that has formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (USDA-NRCS 2010). Indicators of the presence of a hydric soil include soil colour (gleyed soils and soils with bright mottles and/or low matrix chroma), aquic or preaquic moisture regime, reducing soil conditions, sulfidic material (odour), soils listed on the hydric soils list, iron and manganese concretions, organic soils (histosols), histic epipedon, high organic content in surface layer in sandy soils, and organic streaking in sandy soils.

Soil pits were excavated to a maximum depth of 40 cm or refusal. The soil in each was then examined for hydric soil indicators. The matrix colour and mottle colour (if present) of the soil were determined using the Munsell Soil Colour Charts.

Determination of Wetland Hydrology

Wetland habitat, by definition, either periodically or permanently, has a water table at, near, or above the land surface or that is saturated with water. To be classified as a wetland, a site should have at least one primary indicator or two secondary indicators of wetland hydrology, as shown in Table 2.

Table 2: Indicators of Wetland Hydrology

Examples of Primary Indicators	Examples of Secondary Indicators
Water marks	Oxidized Root Channels in the Upper 30 cm
Drift Lines	Local Soil Survey Data
Sediment Deposition	Dry season Water Table
Drainage Patterns	Stunted or Stressed Plants
Water-stained leaves	
Visual Observation of Saturated Soils	
Visual Observation of Inundation	

Wetland habitat is assessed for signs of hydrology, via visual observations across the area and through assessment of soil pits.

References

Environmental Laboratory (1987), Corps of Engineers Wetlands Delineation Manual, US Army Corp of Engineers, 1987.

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APPENDIX E
ACCDC AND PROJECT SITE PLANT LISTS

Common Name	Scientific Name	SARA Status	NS *ESA* Status	COSEWIC Status	NSDNR Status	NS S-Rank
a Feather Moss	*Hylocomiastrum pyrenaicum*	Not Listed	Not Listed	Not Listed	Sensitive	S3S4
a Moss	*Sematophyllum demissum*	Not Listed	Not Listed	Not Listed	Sensitive	S1S2
a Moss	*Anacamptodon splachnoides*	Not Listed	Not Listed	Not Listed	Sensitive	S2?
a Moss	*Anomodon viticulosus*	Not Listed	Not Listed	Not Listed	Sensitive	S2?
a Moss	*Weissia muhlenbergiana*	Not Listed	Not Listed	Not Listed	Sensitive	S2?
a Moss	*Bryum algovicum*	Not Listed	Not Listed	Not Listed	Sensitive	S2?
a Moss	*Ditrichum rhynchostegium*	Not Listed	Not Listed	Not Listed	Sensitive	S2?
a Moss	*Physcomitrium collenchymatum*	Not Listed	Not Listed	Not Listed	Sensitive	S2?
a Moss	*Sematophyllum marylandicum*	Not Listed	Not Listed	Not Listed	Sensitive	S2?
a Moss	*Pseudotaxiphyllum distichaceum*	Not Listed	Not Listed	Not Listed	Sensitive	S2?
a Moss	*Platylomella lescurii*	Not Listed	Not Listed	Not Listed	Sensitive	S2?
a Moss	*Ephemerum serratum*	Not Listed	Not Listed	Not Listed	Sensitive	S2S3
a Moss	*Tortula truncata*	Not Listed	Not Listed	Not Listed	Sensitive	S2S3
a Moss	*Limprichtia revolvens*	Not Listed	Not Listed	Not Listed	Sensitive	S2S3
a Moss	*Drummondia prorepens*	Not Listed	Not Listed	Not Listed	Sensitive	S3?
a Moss	*Anomodon tristis*	Not Listed	Not Listed	Not Listed	Sensitive	S3?
a Moss	*Thamnobryum alleghaniense*	Not Listed	Not Listed	Not Listed	Sensitive	S3S4
a Pussytoes	*Antennaria parlinii*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1
Acadian Quillwort	*Isoetes acadiensis*	Not Listed	Not Listed	Not Listed	Sensitive	S3
Alder Silk Moss	*Plagiothecium latebricola*	Not Listed	Not Listed	Not Listed	Sensitive	S1S2
Aloe-Like Rigid Screw Moss	*Aloina rigida*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1?
Alpine Bilberry	*Vaccinium uliginosum*	Not Listed	Not Listed	Not Listed	Sensitive	S3
American Cancer-root	*Conopholis americana*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1S2
American False Pennyroyal	*Hedeoma pulegioides*	Not Listed	Not Listed	Not Listed	Sensitive	S2S3
Anomalous Bristle Moss	*Orthotrichum anomalum*	Not Listed	Not Listed	Not Listed	Sensitive	S2?
Appalachian Fir-Clubmoss	*Huperzia appalachiana*	Not Listed	Not Listed	Not Listed	Sensitive	S3
Appalachian Speckleback Lichen	*Punctelia appalachensis*	Not Listed	Not Listed	Not Listed	Sensitive	S3
Appressed Jellyskin Lichen	*Leptogium subtile*	Not Listed	Not Listed	Not Listed	Sensitive	S3
Autumn Willow	*Salix serissima*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1
Bark Willow Moss	*Platydictya subtilis*	Not Listed	Not Listed	Not Listed	Sensitive	S2S3
Beaded Jellyskin Lichen	*Leptogium teretiusculum*	Not Listed	Not Listed	Not Listed	Sensitive	S2?
Bearded Sedge	*Carex comosa*	Not Listed	Not Listed	Not Listed	Sensitive	S2
Bebb's Sedge	*Carex bebbii*	Not Listed	Not Listed	Not Listed	Sensitive	S2
Big-leaved Marsh-elder	*Iva frutescens ssp. oraria*	Not Listed	Not Listed	Not Listed	Sensitive	S2S3
Black Ash	*Fraxinus nigra*	Not Listed	Threatened	Not Listed	At Risk	S1S2
Black-foam Lichen	*Anzia colpodes*	Not Listed	Not Listed	Threatened	Sensitive	S3
Black-footed Reindeer Lichen	*Cladina stygia*	Not Listed	Not Listed	Not Listed	Sensitive	S3?
Blistered Jellyskin Lichen	*Leptogium corticola*	Not Listed	Not Listed	Not Listed	Sensitive	S3
Blistered Tarpaper Lichen	*Collema nigrescens*	Not Listed	Not Listed	Not Listed	Sensitive	S3
Blood Milkwort	*Polygala sanguinea*	Not Listed	Not Listed	Not Listed	Sensitive	S3
Blue Cohosh	*Caulophyllum thalictroides*	Not Listed	Not Listed	Not Listed	May Be At Risk	S2
Blue Felt Lichen	*Degelia plumbea*	Special Concern	Vulnerable	Special Concern	4 Secure	S3
Blueberry Willow	*Salix myrtillifolia*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1
Blunt Sweet Cicely	*Osmorhiza depauperata*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1
Blunt-leaved Bedstraw	*Galium obtusum*	Not Listed	Not Listed	Not Listed	Sensitive	S2S3
Bog Birch	*Betula pumila*	Not Listed	Not Listed	Not Listed	Sensitive	S3
Bog Birch	*Betula pumila var. pumila*	Not Listed	Not Listed	Not Listed	Sensitive	S3
Bog Willow	*Salix pedicellaris*	Not Listed	Not Listed	Not Listed	Sensitive	S2
Boreal Aster	*Symphyotrichum boreale*	Not Listed	Not Listed	Not Listed	Sensitive	S2?
Boreal Felt Lichen - Atlantic pop.	*Erioderma pedicellatum (Atlantic pop.)*	Endangered	Endangered	Endangered	At Risk	S1
Bottlebrush Frost Lichen	*Physconia detersa*	Not Listed	Not Listed	Not Listed	Sensitive	S3S4

Common Name	Scientific Name	SARA Status	NS *ESA* Status	COSEWIC Status	NSDNR Status	NS S-Rank
Bristle-leaved Sedge	*Carex eburnea*	Not Listed	Not Listed	Not Listed	Sensitive	S3
Broad-Glumed Brome	*Bromus latiglumis*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1
Canada Anemone	*Anemone canadensis*	Not Listed	Not Listed	Not Listed	May Be At Risk	S2
Canada Cinquefoil	*Potentilla canadensis*	Not Listed	Not Listed	Not Listed	Sensitive	S2S3
Canada Germander	*Teucrium canadense*	Not Listed	Not Listed	Not Listed	Sensitive	S3
Canada Lily	*Lilium canadense*	Not Listed	Not Listed	Not Listed	May Be At Risk	S2
Canada Rice Grass	*Piptatherum canadense*	Not Listed	Not Listed	Not Listed	Sensitive	S2
Canada Tick-trefoil	*Desmodium canadense*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1
Canada Wood Nettle	*Laportea canadensis*	Not Listed	Not Listed	Not Listed	Sensitive	S3
Case's Ladies'-Tresses	*Spiranthes casei var. casei*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1
Case's Ladies'-Tresses	*Spiranthes casei*	Not Listed	Not Listed	Not Listed	Sensitive	S2
Case's Ladies'-Tresses	*Spiranthes casei var. novaescotiae*	Not Listed	Not Listed	Not Listed	Sensitive	S2
Chestnut Sedge	*Carex castanea*	Not Listed	Not Listed	Not Listed	May Be At Risk	S2
Chinese Hemlock-parsley	*Conioselinum chinense*	Not Listed	Not Listed	Not Listed	Sensitive	S2
Clammy Hedge-Hyssop	*Gratiola neglecta*	Not Listed	Not Listed	Not Listed	Sensitive	S1S2
Climbing False Buckwheat	*Polygonum scandens*	Not Listed	Not Listed	Not Listed	Sensitive	S3
Clustered Sanicle	*Sanicula odorata*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1
Coast Creeping Moss	*Conardia compacta*	Not Listed	Not Listed	Not Listed	Sensitive	S1?
Coast Pepper-Bush	*Clethra alnifolia*	Special Concern	Vulnerable	Special Concern	At Risk	S1
Coastal Bushy Beard Lichen	*Usnea flammea*	Not Listed	Not Listed	Not Listed	Sensitive	S2S3
Coastal Plain Blue-eyed-grass	*Sisyrinchium fuscatum*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1
Coastal Plain Joe-pye-weed	*Eupatorium dubium*	Not Listed	Not Listed	Not Listed	May Be At Risk	S2
Common Bedstraw	*Galium aparine*	Not Listed	Not Listed	Not Listed	Sensitive	S2S3
Common Buttonbush	*Cephalanthus occidentalis*	Not Listed	Not Listed	Not Listed	Sensitive	S3
Common Moonwort	*Botrychium lunaria*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1
Cursed Buttercup	*Ranunculus sceleratus*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1S2
Cut-Leaved Coneflower	*Rudbeckia laciniata*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1S2
Cut-Leaved Coneflower	*Rudbeckia laciniata var. gaspereauensis*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1S2
Disguised St John's-wort	*Hypericum dissimulatum*	Not Listed	Not Listed	Not Listed	Sensitive	S2S3
Donian Beardless Moss	*Seligeria donniana*	Not Listed	Not Listed	Not Listed	Sensitive	S2?
Downy Rattlesnake-Plantain	*Goodyera pubescens*	Not Listed	Not Listed	Not Listed	Sensitive	S2
Downy Willowherb	*Epilobium strictum*	Not Listed	Not Listed	Not Listed	Sensitive	S3
Drummond's Rockcress	*Arabis drummondii*	Not Listed	Not Listed	Not Listed	Sensitive	S2
Dwarf Clearweed	*Pilea pumila*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1
Eastern Leatherwood	*Dirca palustris*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1
Eastern Lilaeopsis	*Lilaeopsis chinensis*	Special Concern	Vulnerable	Special Concern	Sensitive	S2
Eastern Waterfan	*Peltigera hydrothyria*	Not Listed	Not Listed	Threatened	May Be At Risk	S1
Eastern White Cedar	*Thuja occidentalis*	Not Listed	Vulnerable	Not Listed	At Risk	S1
Estuary Beggarticks	*Bidens hyperborea*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1
Eyed Mossthorns Woollybear Lichen	*Polychidium muscicola*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1?
False Mermaidweed	*Floerkea proserpinacoides*	Not Listed	Not Listed	Not At Risk	Sensitive	S2
Farwell's Water Milfoil	*Myriophyllum farwellii*	Not Listed	Not Listed	Not Listed	Sensitive	S2
Field Locoweed	*Oxytropis campestris var. johannensis*	Not Listed	Not Listed	Not Listed	May Be At Risk	S2
Flat-stemmed Pondweed	*Potamogeton zosteriformis*	Not Listed	Not Listed	Not Listed	Sensitive	S3
Forked Bluecurls	*Trichostema dichotomum*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1
Fragrant Wood Fern	*Dryopteris fragrans var. remotiuscula*	Not Listed	Not Listed	Not Listed	Sensitive	S2
Fries' Pondweed	*Potamogeton friesii*	Not Listed	Not Listed	Not Listed	May Be At Risk	S2
Fringed Blue Aster	*Symphyotrichum ciliolatum*	Not Listed	Not Listed	Not Listed	Sensitive	S2
Frosted Glass-whiskers Lichen - Nova Scotia p	*Sclerophora peronella (Nova Scotia pop.)*	Special Concern	Not Listed	Special Concern	Not Listed	S1?
Garber's Sedge	*Carex garberi*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1
Ghost Antler Lichen	*Pseudevernia cladonia*	Not Listed	Not Listed	Not At Risk	Sensitive	S2S3

Common Name	Scientific Name	SARA Status	NS *ESA* Status	COSEWIC Status	NSDNR Status	NS S-Rank
Giant Spear Moss	*Calliergon giganteum*	Not Listed	Not Listed	Not Listed	Sensitive	S3?
Glaucous Blue Grass	*Poa glauca*	Not Listed	Not Listed	Not Listed	Sensitive	S2S3
Golden Alexanders	*Zizia aurea*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1
Goldencrest	*Lophiola aurea*	Threatened	Vulnerable	Special Concern	At Risk	S2
Graceful Felt Lichen	*Erioderma mollissimum*	Not Listed	Endangered	Endangered	May Be At Risk	S1S2
Grassleaf Rush	*Juncus marginatus*	Not Listed	Not Listed	Not Listed	Sensitive	S3
Greater Poverty Rush	*Juncus anthelatus*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1?
Green Spleenwort	*Asplenium trichomanes-ramosum*	Not Listed	Not Listed	Not Listed	Sensitive	S3
Green Starburst Lichen	*Parmeliopsis ambigua*	Not Listed	Not Listed	Not Listed	Sensitive	S2S3
Greene's Rush	*Juncus greenei*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1S2
Greenland Stitchwort	*Minuartia groenlandica*	Not Listed	Not Listed	Not Listed	Sensitive	S3
Hairlike Sedge	*Carex capillaris*	Not Listed	Not Listed	Not Listed	Sensitive	S2
Hairy Goldenrod	*Solidago hispida*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1?
Hairy Lettuce	*Lactuca hirsuta var. sanguinea*	Not Listed	Not Listed	Not Listed	Sensitive	S2
Halberd-leaved Tearthumb	*Polygonum arifolium*	Not Listed	Not Listed	Not Listed	Sensitive	S2
Hayden's Sedge	*Carex haydenii*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1
Heart-leaved Foamflower	*Tiarella cordifolia*	Not Listed	Not Listed	Not Listed	Sensitive	S2
Horn-leaved Riverweed	*Podostemum ceratophyllum*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1
Houghton's Sedge	*Carex houghtoniana*	Not Listed	Not Listed	Not Listed	Sensitive	S2S3
Hyssop-leaved Fleabane	*Erigeron hyssopifolius*	Not Listed	Not Listed	Not Listed	Sensitive	S3
Intermediate Mermaidweed	*Proserpinaca intermedia*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1S2
Inverted Bladderwort	*Utricularia resupinata*	Not Listed	Not Listed	Not Listed	Sensitive	S2
Labrador Bedstraw	*Galium labradoricum*	Not Listed	Not Listed	Not Listed	Sensitive	S2
Lance-Leaf Grape-Fern	*Botrychium lanceolatum var. angustisegmentum*	Not Listed	Not Listed	Not Listed	Sensitive	S2S3
Large Round-Leaved Orchid	*Platanthera macrophylla*	Not Listed	Not Listed	Not Listed	Sensitive	S2
Large St John's-wort	*Hypericum majus*	Not Listed	Not Listed	Not Listed	Sensitive	S2
Large Tick-Trefoil	*Desmodium glutinosum*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1
Large Toothwort	*Cardamine maxima*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1S2
Least Moonwort	*Botrychium simplex*	Not Listed	Not Listed	Not Listed	Sensitive	S2S3
Lesser Brown Sedge	*Carex adusta*	Not Listed	Not Listed	Not Listed	Sensitive	S2S3
Lesser Pyrola	*Pyrola minor*	Not Listed	Not Listed	Not Listed	Sensitive	S3
Lesser Rattlesnake-plantain	*Goodyera repens*	Not Listed	Not Listed	Not Listed	Sensitive	S3
Lesser Smoothcap Moss	*Atrichum angustatum*	Not Listed	Not Listed	Not Listed	Sensitive	S2?
Light Beaked Moss	*Eurhynchium hians*	Not Listed	Not Listed	Not Listed	Sensitive	S2S3
Livid Sedge	*Carex livida var. radicaulis*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1S2
Long-bracted Frog Orchid	*Coeloglossum viride var. virescens*	Not Listed	Not Listed	Not Listed	May Be At Risk	S2S3
Long-branched Frostweed	*Helianthemum canadense*	Not Listed	Endangered	Not Listed	At Risk	S1
Long-leaved Starwort	*Stellaria longifolia*	Not Listed	Not Listed	Not Listed	Sensitive	S2
Long's Bulrush	*Scirpus longii*	Special Concern	Vulnerable	Special Concern	Sensitive	S3
Loose-Flowered Sedge	*Carex laxiflora*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1
Lustrous Peat Moss	*Sphagnum subnitens*	Not Listed	Not Listed	Not Listed	Sensitive	S2?
Marsh Bellflower	*Campanula aparinoides*	Not Listed	Not Listed	Not Listed	Sensitive	S3
Marsh Horsetail	*Equisetum palustre*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1
Marsh Mermaidweed	*Proserpinaca palustris var. palustris*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1?
Meadow Horsetail	*Equisetum pratense*	Not Listed	Not Listed	Not Listed	Sensitive	S3
Meadow Plait Moss	*Hypnum pratense*	Not Listed	Not Listed	Not Listed	Sensitive	S1S2
Metropolitan Timmia Moss	*Timmia megapolitana*	Not Listed	Not Listed	Not Listed	Sensitive	S1S2
Michaux's Dwarf Birch	*Betula michauxii*	Not Listed	Not Listed	Not Listed	Sensitive	S2S3
Mistassini Primrose	*Primula mistassinica*	Not Listed	Not Listed	Not Listed	Sensitive	S2
Mountain Forest Grimmia	*Grimmia anomala*	Not Listed	Not Listed	Not Listed	Sensitive	S2?
Mucronate Screw Moss	*Tortula mucronifolia*	Not Listed	Not Listed	Not Listed	Sensitive	S1S2

Common Name	Scientific Name	SARA Status	NS *ESA* Status	COSEWIC Status	NSDNR Status	NS S-Rank
Naked Kidney Lichen	*Nephroma bellum*	Not Listed	Not Listed	Not Listed	Sensitive	S3
Nantucket Serviceberry	*Amelanchier nantucketensis*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1
Narrow-leaved Panic Grass	*Dichanthelium linearifolium*	Not Listed	Not Listed	Not Listed	Sensitive	S2
Necklace Spike Sedge	*Carex ormostachya*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1
Nodding Fescue	*Festuca subverticillata*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1S2
Northern Adder's-tongue	*Ophioglossum pusillum*	Not Listed	Not Listed	Not Listed	Sensitive	S2S3
Northern Bedstraw	*Galium boreale*	Not Listed	Not Listed	Not Listed	May Be At Risk	S2
Northern Blueberry	*Vaccinium boreale*	Not Listed	Not Listed	Not Listed	Sensitive	S3
Northern Bog Sedge	*Carex gynocrates*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1
Northern Bog Violet	*Viola nephrophylla*	Not Listed	Not Listed	Not Listed	Sensitive	S2
Northern Maidenhair Fern	*Adiantum pedatum*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1
One-sided Groove Moss	*Aulacomnium heterostichum*	Not Listed	Not Listed	Not Listed	Sensitive	S1S2
Orange-fruited Tinker's Weed	*Triosteum aurantiacum*	Not Listed	Not Listed	Not Listed	Sensitive	S2S3
Ovate Spikerush	*Eleocharis ovata*	Not Listed	Not Listed	Not Listed	Sensitive	S2?
Pale Jewelweed	*Impatiens pallida*	Not Listed	Not Listed	Not Listed	Sensitive	S2
Pale-Spiked Lobelia	*Lobelia spicata*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1
Pennsylvania Buttercup	*Ranunculus pensylvanicus*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1
Pennsylvania Sedge	*Carex pensylvanica*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1?
Peppered Moon Lichen	*Sticta fuliginosa*	Not Listed	Not Listed	Not Listed	Sensitive	S3
Petalled Rocktripe Lichen	*Umbilicaria polyphylla*	Not Listed	Not Listed	Not Listed	Sensitive	S2S3
Philadelphia Fleabane	*Erigeron philadelphicus*	Not Listed	Not Listed	Not Listed	Sensitive	S2
Pinebarren Golden Heather	*Hudsonia ericoides*	Not Listed	Not Listed	Not Listed	Sensitive	S2
Pink Crowberry	*Empetrum eamesii ssp. atropurpureum*	Not Listed	Not Listed	Not Listed	Sensitive	S2S3
Pink Crowberry	*Empetrum eamesii ssp. eamesii*	Not Listed	Not Listed	Not Listed	Sensitive	S2S3
Pink Crowberry	*Empetrum eamesii*	Not Listed	Not Listed	Not Listed	Sensitive	S3
Plantain-Leaved Sedge	*Carex plantaginea*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1
Poor-man's Shingles Lichen	*Parmeliella parvula*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1?
Porcupine Sedge	*Carex hystericina*	Not Listed	Not Listed	Not Listed	May Be At Risk	S2
Powdered Moon Lichen	*Sticta limbata*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1S2
Powder-tipped Antler Lichen	*Everniastrum catawbiense*	Not Listed	Not Listed	Not Listed	May Be At Risk	S2S3
Prairie Sedge	*Carex prairea*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1
Prickly Hornwort	*Ceratophyllum echinatum*	Not Listed	Not Listed	Not Listed	Sensitive	S2S3
Prototype Quillwort	*Isoetes prototypus*	Special Concern	Vulnerable	Special Concern	Sensitive	S2
Pubescent Sedge	*Carex hirtifolia*	Not Listed	Not Listed	Not Listed	Sensitive	S2S3
Purple Clematis	*Clematis occidentalis*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1
Purple-veined Willowherb	*Epilobium coloratum*	Not Listed	Not Listed	Not Listed	Sensitive	S2?
Pygmy Pocket Moss	*Fissidens exilis*	Not Listed	Not Listed	Not At Risk	At Risk	S1S2
Ram's-Head Lady's-Slipper	*Cypripedium arietinum*	Not Listed	Endangered	Not Listed	At Risk	S1
Red Ash	*Fraxinus pennsylvanica*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1
Redroot	*Lachnanthes caroliniana*	Threatened	Vulnerable	Special Concern	At Risk	S2
Richardson's Pondweed	*Potamogeton richardsonii*	Not Listed	Not Listed	Not Listed	May Be At Risk	S2
Rimmed Shingles Lichen	*Fuscopannaria leucosticta*	Not Listed	Not Listed	Not Listed	May Be At Risk	S2S3
Robbins' Milkvetch	*Astragalus robbinsii var. minor*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1
Robinson's Hawkweed	*Hieracium robinsonii*	Not Listed	Not Listed	Not Listed	Sensitive	S2S3
Rock Spikemoss	*Selaginella rupestris*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1
Rock Whitlow-Grass	*Draba glabella*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1
Rock Whitlow-Grass	*Draba arabisans*	Not Listed	Not Listed	Not Listed	Sensitive	S2
Roland's Sea-Blite	*Suaeda rolandii*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1?
Rosy Pussytoes	*Antennaria rosea ssp. arida*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1
Round-lobed Hepatica	*Hepatica nobilis var. obtusa*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1S2
Rugel's Anomodon Moss	*Anomodon rugelii*	Not Listed	Not Listed	Not Listed	Sensitive	S3S4

Common Name	Scientific Name	SARA Status	NS *ESA* Status	COSEWIC Status	NSDNR Status	NS S-Rank
Sage Willow	*Salix candida*	Not Listed	Endangered	Not Listed	May Be At Risk	S1
Saltmarsh Agalinis	*Agalinis maritima*	Not Listed	Not Listed	Not Listed	Sensitive	S2
Saltmarsh Starwort	*Stellaria humifusa*	Not Listed	Not Listed	Not Listed	Sensitive	S2
Satiny Willow	*Salix pellita*	Not Listed	Not Listed	Not Listed	Sensitive	S2S3
Scabrous Black Sedge	*Carex atratiformis*	Not Listed	Not Listed	Not Listed	Sensitive	S2
Scaly Fringe Lichen	*Heterodermia squamulosa*	Not Listed	Not Listed	Not Listed	Sensitive	S3
Scaly Pelt Lichen	*Peltigera lepidophora*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1
Seabeach Ragwort	*Senecio pseudoarnica*	Not Listed	Not Listed	Not Listed	Sensitive	S2S3
Seaside Brookweed	*Samolus valerandi ssp. parviflorus*	Not Listed	Not Listed	Not Listed	Sensitive	S3
Seaside Spurge	*Chamaesyce polygonifolia*	Not Listed	Not Listed	Not Listed	Sensitive	S2S3
Secund Rush	*Juncus secundus*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1
Shining Ladies'-Tresses	*Spiranthes lucida*	Not Listed	Not Listed	Not Listed	May Be At Risk	S2
Short-pointed Lantern Moss	*Cyrtomnium hymenophylloides*	Not Listed	Not Listed	Not Listed	Sensitive	S2?
Showy Lady's-Slipper	*Cypripedium reginae*	Not Listed	Not Listed	Not Listed	May Be At Risk	S2
Silky Willow	*Salix sericea*	Not Listed	Not Listed	Not Listed	May Be At Risk	S2
Sleepy Catchfly	*Silene antirrhina*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1
Slender Blue Flag	*Iris prismatica*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1
Slender Cottongrass	*Eriophorum gracile*	Not Listed	Not Listed	Not Listed	Sensitive	S2S3
Slender Panic Grass	*Dichanthelium xanthophysum*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1
Slender Rice Grass	*Piptatherum pungens*	Not Listed	Not Listed	Not Listed	Sensitive	S2
Slender Wood Sedge	*Carex digitalis*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1
Slim-stemmed Reed Grass	*Calamagrostis stricta ssp. stricta*	Not Listed	Not Listed	Not Listed	Sensitive	S1S2
Small Yellow Lady's-Slipper	*Cypripedium parviflorum var. makasin*	Not Listed	Not Listed	Not Listed	Sensitive	S2
Small-flowered Bittercress	*Cardamine parviflora var. arenicola*	Not Listed	Not Listed	Not Listed	Sensitive	S2
Small-spike False-nettle	*Boehmeria cylindrica*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1
Smooth Alder	*Alnus serrulata*	Not Listed	Not Listed	Not Listed	Sensitive	S3
Smooth Cliff Fern	*Woodsia glabella*	Not Listed	Not Listed	Not Listed	Sensitive	S2
Smooth Sweet Cicely	*Osmorhiza longistylis*	Not Listed	Not Listed	Not Listed	May Be At Risk	S2
Soapberry	*Shepherdia canadensis*	Not Listed	Not Listed	Not Listed	Sensitive	S2S3
Southern Rein Orchid	*Platanthera flava var. flava*	Not Listed	Not Listed	Not Listed	Sensitive	S2
Southern Rein-Orchid	*Platanthera flava*	Not Listed	Not Listed	Not Listed	Sensitive	S2
Spotted Pondweed	*Potamogeton pulcher*	Not Listed	Vulnerable	Not Listed	Sensitive	S2S3
Spreading Wild Rye	*Elymus hystrix var. bigeloviana*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1
Spurred Gentian	*Halenia deflexa*	Not Listed	Not Listed	Not Listed	Sensitive	S2S3
Stalked Bulrush	*Scirpus pedicellatus*	Not Listed	Not Listed	Not Listed	Sensitive	S2?
Starke's Fork Moss	*Kiaeria starkei*	Not Listed	Not Listed	Not Listed	Sensitive	S2?
Steller's Rockbrake	*Cryptogramma stelleri*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1S2
Streamside Peat Moss	*Sphagnum riparium*	Not Listed	Not Listed	Not Listed	Sensitive	S3?
Stretched Jellyskin Lichen	*Leptogium milligranum*	Not Listed	Not Listed	Not Listed	Sensitive	S2S3
Swan's Sedge	*Carex swanii*	Not Listed	Not Listed	Not Listed	Sensitive	S3
Sweet Wood Reed Grass	*Cinna arundinacea*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1S2
Tall Beakrush	*Rhynchospora macrostachya*	Not Listed	Not Listed	Endangered	May Be At Risk	S1
Tattered Jellyskin Lichen	*Leptogium lichenoides*	Not Listed	Not Listed	Not Listed	May Be At Risk	S3
Tender Sedge	*Carex tenera*	Not Listed	Not Listed	Not Listed	Sensitive	S2
Thick Ragged Moss	*Brachythecium turgidum*	Not Listed	Not Listed	Not Listed	Sensitive	S1S2
Thomson's Leafy Moss	*Mnium thomsonii*	Not Listed	Not Listed	Not Listed	Sensitive	S1S2
Thread-Like Naiad	*Najas gracillima*	Not Listed	Not Listed	Not Listed	Sensitive	S2
Thyme-Leaved Speedwell	*Veronica serpyllifolia ssp. humifusa*	Not Listed	Not Listed	Not Listed	Sensitive	S2S3
Toothed-leaved Nitrogen Moss	*Tetraplodon angustatus*	Not Listed	Not Listed	Not Listed	Sensitive	S2?
Torrey's Bulrush	*Schoenoplectus torreyi*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1
Tree Pelt Lichen	*Peltigera collina*	Not Listed	Not Listed	Not Listed	Sensitive	S2?

Table E1: Short List of Rare Plant and Lichen Species Identified Within 100 km of the Project Site, Ellershouse Wind Farm Expansion ***Project#16-5807***

Common Name	Scientific Name	SARA Status	NS *ESA* Status	COSEWIC Status	NSDNR Status	NS S-Rank
Triangular-valve Dock	*Rumex salicifolius var. mexicanus*	Not Listed	Not Listed	Not Listed	Sensitive	S2
Tuckerman's Sedge	*Carex tuckermanii*	Not Listed	Not Listed	Not Listed	Sensitive	S2
Tufted Fen Moss	*Paludella squarrosa*	Not Listed	Not Listed	Not Listed	Sensitive	S1?
Valley Oakmoss Lichen	*Evernia prunastri*	Not Listed	Not Listed	Not Listed	Sensitive	S3S4
Vasey Rush	*Juncus vaseyi*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1
Veined Shingle Lichen	*Pannaria lurida*	Not Listed	Not Listed	Threatened	May Be At Risk	S1S2
Virginia Anemone	*Anemone virginiana var. alba*	Not Listed	Not Listed	Not Listed	Sensitive	S1S2
Virginia Anemone	*Anemone virginiana*	Not Listed	Not Listed	Not Listed	Sensitive	S2
Virginia Anemone	*Anemone virginiana var. virginiana*	Not Listed	Not Listed	Not Listed	Sensitive	S2
Water Blinks	*Montia fontana*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1
Water Pygmyweed	*Crassula aquatica*	Not Listed	Not Listed	Not Listed	Sensitive	S2
Wavy-leaved Aster	*Symphyotrichum undulatum*	Not Listed	Not Listed	Not Listed	Sensitive	S2
Western Hairy Rockcress	*Arabis hirsuta var. pycnocarpa*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1S2
White Adder's-Mouth	*Malaxis brachypoda*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1
White Ash	*Fraxinus americana*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1
White Mountain Saxifrage	*Saxifraga paniculata ssp. neogaea*	Not Listed	Not Listed	Not Listed	Sensitive	S2
White Snakeroot	*Ageratina altissima*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1
White-stemmed Pondweed	*Potamogeton praelongus*	Not Listed	Not Listed	Not Listed	Sensitive	S3
White-Tinged Sedge	*Carex peckii*	Not Listed	Not Listed	Not Listed	May Be At Risk	S2?
Whorled Water Milfoil	*Myriophyllum verticillatum*	Not Listed	Not Listed	Not Listed	Sensitive	S2
Wiegand's Sedge	*Carex wiegandii*	Not Listed	Not Listed	Not Listed	Sensitive	S3
Wiegand's Wild Rye	*Elymus wiegandii*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1
Wild Celery	*Vallisneria americana*	Not Listed	Not Listed	Not Listed	May Be At Risk	S2
Wild Chives	*Allium schoenoprasum var. sibiricum*	Not Listed	Not Listed	Not Listed	May Be At Risk	S2
Wild Comfrey	*Cynoglossum virginianum var. boreale*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1
Wild Leek	*Allium tricoccum*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1
Wood Anemone	*Anemone quinquefolia*	Not Listed	Not Listed	Not Listed	Sensitive	S2
Woodland Owl Lichen	*Solorina saccata*	Not Listed	Not Listed	Not Listed	May Be At Risk	S2S3
Woods-Rush	*Juncus subcaudatus var. planisepalus*	Not Listed	Not Listed	Not Listed	Sensitive	S3
Woolly Sedge	*Carex pellita*	Not Listed	Not Listed	Not Listed	May Be At Risk	S1
Yellow Lady's-slipper	*Cypripedium parviflorum var. pubescens*	Not Listed	Not Listed	Not Listed	Sensitive	S2
Yellow Lady's-slipper	*Cypripedium parviflorum*	Not Listed	Not Listed	Not Listed	Sensitive	S2S3
Yellow Marsh Marigold	*Caltha palustris*	Not Listed	Not Listed	Not Listed	Sensitive	S2
Yellow Spikerush	*Eleocharis olivacea*	Not Listed	Not Listed	Not Listed	Sensitive	S2S3
Yew-leaved Pocket Moss	*Fissidens taxifolius*	Not Listed	Not Listed	Not Listed	Sensitive	S2?

Table E2: Plant Species Observed during 2016 Field Surveys, Ellershouse Wind Farm Expansion ***Project# 16-5807***

Common Name	Scientific Name	SARA Status	NSESA Status	COSEWIC Status	NSDNR Status	NS S-Rank
A club moss	*lycopodium clavatum*	Not Listed	Not Listed	Not Listed	Secure	S5
a plant	*Hypericum boreale*	Not Listed	Not Listed	Not Listed	Secure	S5
A Sedge	*Carex gynandra*	Not Listed	Not Listed	Not Listed	Secure	S5
A Sedge	*Carex communis*	Not Listed	Not Listed	Not Listed	Secure	S5
A Sedge	*Carex folliculata*	Not Listed	Not Listed	Not Listed	Secure	S5
Alternate-leaved Dogwood	*Cornus alternifolia*	Not Listed	Not Listed	Not Listed	Secure	S5
American Beech	*Fagus grandifolia*	Not Listed	Not Listed	Not Listed	Secure	S5
American Fly-Honeysuckle	*Lonicera canadensis*	Not Listed	Not Listed	Not Listed	Secure	S5
American Mountain Ash	*Sorbus americana*	Not Listed	Not Listed	Not Listed	Secure	S5
Arrow-Leaved Tearthumb	*Polygonum sagittatum*	Not Listed	Not Listed	Not Listed	Not Listed	S5
Balsam Fir	*Abies balsamea*	Not Listed	Not Listed	Not Listed	Secure	S5
Beaked Hazelnut	*Corylus cornuta*	Not Listed	Not Listed	Not Listed	Secure	S5
Beaked Willow	*Salix bebbiana*	Not Listed	Not Listed	Not Listed	Secure	S5
Bedstraw sp	*Galium sp*	Not Listed	Not Listed	Not Listed	N/A	N/A
Bellwort	*Uvularia sessilifolia*	Not Listed	Not Listed	Not Listed	Secure	S4S5
Birds-Foot Trefoil	*Lotus corniculatus*	Not Listed	Not Listed	Not Listed	Exotic	SNA
Black Cherry	*Prunus serotina*	Not Listed	Not Listed	Not Listed	Secure	S5
Black Holly	*Ilex verticillata*	Not Listed	Not Listed	Not Listed	Secure	S5
Black Knapweed	*Centaurea nigra*	Not Listed	Not Listed	Not Listed	Exotic	SNA
Black Starthistle	*Centaurea nigra*	Not Listed	Not Listed	Not Listed	Exotic	SNA
Bladder Sedge	*Carex intumescens*	Not Listed	Not Listed	Not Listed	Secure	S5
Boneset	*Eupatorium perfoliatum*	Not Listed	Not Listed	Not Listed	Secure	S5
Bristly Black Currant	*Ribes lacustre*	Not Listed	Not Listed	Not Listed	Secure	S5
Bristly Dewberry	*Rubus hispidus*	Not Listed	Not Listed	Not Listed	Secure	S5
Bristly Sarsparilla	*Aralia hispida*	Not Listed	Not Listed	Not Listed	Secure	S5
Broad-Leaf Cattail	*Typha latifolia*	Not Listed	Not Listed	Not Listed	Secure	S5
Bullrush	*Scirpus hattorianus*	Not Listed	Not Listed	Not Listed	Secure	S5
Canada Manna-Grass	*Glyceria canadensis*	Not Listed	Not Listed	Not Listed	Secure	S5
Christmas Fern	*Polystichum acrostichoides*	Not Listed	Not Listed	Not Listed	Secure	S5
Cinnamon Fern	*Osmunda cinnamomea*	Not Listed	Not Listed	Not Listed	Secure	S5
Colt's Foot	*Tussilago farfara*	Not Listed	Not Listed	Not Listed	Exotic	SNA
Common Blackberry	*Rubus allegheniensis*	Not Listed	Not Listed	Not Listed	Secure	S5
Common Burdock	*Arctium minus*	Not Listed	Not Listed	Not Listed	Exotic	SNA
Common Dandelion	*Taraxacum officinale*	Not Listed	Not Listed	Not Listed	Exotic	SNA
Common St John's-wort	*Hypericum perforatum*	Not Listed	Not Listed	Not Listed	Exotic	SNA

Table E2: Plant Species Observed during 2016 Field Surveys, Ellershouse Wind Farm Expansion ***Project# 16-5807***

Common Name	Scientific Name	SARA Status	NSESA Status	COSEWIC Status	NSDNR Status	NS S-Rank
Common Woodrush	*Luzula multiflora*	Not Listed	Not Listed	Not Listed	Secure	S5
Cottongrass Bulrush	*Scirpus cyperinus*	Not Listed	Not Listed	Not Listed	Secure	S5
cow wheat	*Melampyrum lineare*	Not Listed	Not Listed	Not Listed	Secure	S5
Creeping Snowberry	*Gaultheria hispidula*	Not Listed	Not Listed	Not Listed	Secure	S5
Crested Shield-Fern	*Dryopteris cristata*	Not Listed	Not Listed	Not Listed	Secure	S5
Daisy Fleabane	*Erigeron strigosus*	Not Listed	Not Listed	Not Listed	Secure	S5
Deptford-Pink	*Dianthus armeria*	Not Listed	Not Listed	Not Listed	Exotic	SNA
Downy Alder	*Alnus viridis*	Not Listed	Not Listed	Not Listed	Secure	S5
Dwarf Dogwood	*Cornus canadensis*	Not Listed	Not Listed	Not Listed	Secure	S5
Dwarf Red Raspberry	*Rubus pubescens*	Not Listed	Not Listed	Not Listed	Secure	S5
Eastern Hemlock	*Tsuga canadensis*	Not Listed	Not Listed	Not Listed	Secure	S4S5
Eastern White Pine	*Pinus strobus*	Not Listed	Not Listed	Not Listed	Secure	S5
Evening-primrose	*Oenothera biennis*	Not Listed	Not Listed	Not Listed	Secure	S5
eyebright	*Euphrasia officinalis*	N/A	N/A	N/A	N/A	N/A
Fall Dandelion	*Leontodon autumnalis*	Not Listed	Not Listed	Not Listed	Exotic	SNA
Field Horsetail	*Equisetum arvense*	Not Listed	Not Listed	Not Listed	Secure	S5
Fireweed	*Chamerion angustifolium*	Not Listed	Not Listed	Not Listed	Secure	S5
Fowl Manna-Grass	*Glyceria striata*	Not Listed	Not Listed	Not Listed	Secure	S5
Fringed Sedge	*Carex crinita*	Not Listed	Not Listed	Not Listed	Secure	S5
Gray Birch	*Betula populifolia*	Not Listed	Not Listed	Not Listed	Secure	S5
Ground Pine	*Lycopodium obscurum*	Not Listed	Not Listed	Not Listed	Secure	S4S5
Gypsy-Weed	*Veronica officinalis*	Not Listed	Not Listed	Not Listed	Exotic	S5
Hairy Woodrush	*Luzula acuminata*	Not Listed	Not Listed	Not Listed	Secure	S5
Hardhack Spiraea	*Spiraea tomentosa*	Not Listed	Not Listed	Not Listed	Secure	S5
Helleborine Orchid	*Epipactis helleborine*	Not Listed	Not Listed	Not Listed	Exotic	SNA
Hobble-bush	*Viburnum lantanoides*	Not Listed	Not Listed	Not Listed	Secure	S5
Indian Cucumber Root	*Medeola virginiana*	Not Listed	Not Listed	Not Listed	Secure	S5
Indian Pipe	*Monotropa uniflora*	Not Listed	Not Listed	Not Listed	Secure	S5
Indian Tobacco	*Lobelia inflata*	Not Listed	Not Listed	Not Listed	Secure	S5
Interrupted Fern	*Osmunda claytoniana*	Not Listed	Not Listed	Not Listed	Secure	S5
Japanese Barberry	*Berberis thunbergii*	Not Listed	Not Listed	Not Listed	Exotic	SNA
Large-Tooth Aspen	*Populus grandidentata*	Not Listed	Not Listed	Not Listed	Secure	S5
Little Club-Spur Orchid	*Platanthera clavellata*	Not Listed	Not Listed	Not Listed	Secure	S5
Low Cudweed	*Gnaphalium uliginosum*	Not Listed	Not Listed	Not Listed	Exotic	SNA
Mayflower	*Epigaea repens*	Not Listed	Not Listed	Not Listed	Secure	S5

Table E2: Plant Species Observed during 2016 Field Surveys, Ellershouse Wind Farm Expansion ***Project# 16-5807***

Common Name	Scientific Name	SARA Status	NSESA Status	COSEWIC Status	NSDNR Status	NS S-Rank
Meadow Timothy	*Phleum pratense*	Not Listed	Not Listed	Not Listed	Exotic	SNA
Mountain Fly-Honeysuckle	*Lonicera villosa*	Not Listed	Not Listed	Not Listed	Secure	S4S5
Mountain Maple	*Acer spicatum*	Not Listed	Not Listed	Not Listed	Secure	S5
Mouseear	*Hieracium pilosella*	Not Listed	Not Listed	Not Listed	Exotic	SNA
Multiflora Rose	*Rosa multiflora*	Not Listed	Not Listed	Not Listed	Exotic	SNA
Narrow-Leaved Meadow-Sweet	*Spiraea alba*	Not Listed	Not Listed	Not Listed	Secure	S5
New Belgium American-Aster	*Symphyotrichum novi-belgii*	Not Listed	Not Listed	Not Listed	Secure	S5
New York Fern	*Thelypteris noveboracensis*	Not Listed	Not Listed	Not Listed	Secure	S5
Nipple-Seed Plantain	*Plantago major*	Not Listed	Not Listed	Not Listed	Exotic	SNA
Northern Beech Fern	*Phegopteris connectilis*	Not Listed	Not Listed	Not Listed	Secure	S5
Northern Bush-Honeysuckle	*Diervilla lonicera*	Not Listed	Not Listed	Not Listed	Secure	S5
Northern Club-spur	Platanthera clavellata	Not Listed	Not Listed	Not Listed	Secure	S5
Northern Lady Fern	Athyrium filix-femina	Not Listed	Not Listed	Not Listed	Secure	S5
Northern Panicgrass	*Dichanthelium boreale*	Not Listed	Not Listed	Not Listed	Secure	S5
Northern Red Oak	*Quercus rubra*	Not Listed	Not Listed	Not Listed	Secure	S5
Northern Slender Ladies-tresses	*Spiranthes lacera*	Not Listed	Not Listed	Not Listed	Secure	S5
Northern Starflower	*Trientalis borealis*	Not Listed	Not Listed	Not Listed	Secure	S5
Oak Fern	*Gymnocarpium dryopteris*	Not Listed	Not Listed	Not Listed	Secure	S5
Old-Field Cinquefoil	*Potentilla simplex*	Not Listed	Not Listed	Not Listed	Secure	S5
Ox-eye Daisy	*Leucanthemum vulgare*	Not Listed	Not Listed	Not Listed	Exotic	SNA
Painted trillium	*Trillium undulatum*	Not Listed	Not Listed	Not Listed	Secure	S5
Pale Sedge	*Carex pallescens*	Not Listed	Not Listed	Not Listed	Secure	S5
panic Grass	*Dichanthelium boreale*	Not Listed	Not Listed	Not Listed	Secure	S5
Paper Birch	*Betula papyrifera*	Not Listed	Not Listed	Not Listed	Secure	S5
Partridge-Berry	*Mitchella repens*	Not Listed	Not Listed	Not Listed	Secure	S5
Pin Cherry	*Prunus pensylvanica*	Not Listed	Not Listed	Not Listed	Secure	S5
Pink Ladyslipper	*Cypripedium acaule*	Not Listed	Not Listed	Not Listed	Secure	S5
Pointed Broom Sedge	*Carex scoparia*	Not Listed	Not Listed	Not Listed	Secure	S5
Poverty Oat Grass	*Danthonia spicata*	Not Listed	Not Listed	Not Listed	Secure	S5
Pussy Willow	*Salix discolor*	Not Listed	Not Listed	Not Listed	Secure	S5
Quaking Aspen	*Populus tremuloides*	Not Listed	Not Listed	Not Listed	Secure	S5
Queen Anne's Lace	*Daucus carota*	Not Listed	Not Listed	Not Listed	Exotic	SNA
Rabbit-Foot Clover	*Trifolium arvense*	Not Listed	Not Listed	Not Listed	Exotic	SNA
Rattlesnake grass	*Glyceria canadensis*	Not Listed	Not Listed	Not Listed	Secure	S5
Red Baneberry	*Actaea rubra*	Not Listed	Not Listed	Not Listed	Secure	S5

Table E2: Plant Species Observed during 2016 Field Surveys, Ellershouse Wind Farm Expansion ***Project# 16-5807***

Common Name	Scientific Name	SARA Status	NSESA Status	COSEWIC Status	NSDNR Status	NS S-Rank
Red Bartsia	*Odontites vernus*	Not Listed	Not Listed	Not Listed	Exotic	SNA
Red Clover	*Trifolium pratense*	Not Listed	Not Listed	Not Listed	Exotic	SNA
Red Raspberry	*Rubus idaeus*	Not Listed	Not Listed	Not Listed	Secure	S5
Red-berried Elder	*Sambucus racemosa*	Not Listed	Not Listed	Not Listed	Secure	S5
Rhodora	*Rhododendron canadense*	Not Listed	Not Listed	Not Listed	Secure	S5
Ribgrass	*Plantago lanceolata*	Not Listed	Not Listed	Not Listed	Exotic	SNA
Robin Runaway	*Dalibarda repens*	Not Listed	Not Listed	Not Listed	Secure	S5
Rosy Twisted Stalk	*Streptopus lanceolatus*	Not Listed	Not Listed	Not Listed	Secure	S5
Rough Bedstraw	*Galium asprellum*	Not Listed	Not Listed	Not Listed	Secure	S5
Rough Goldenrod	*Solidago rugosa*	Not Listed	Not Listed	Not Listed	Secure	S5
Round leaved Sundew	*Drosera rotundifolia*	Not Listed	Not Listed	Not Listed	Secure	S5
Royal Fern	*Osmunda regalis*	Not Listed	Not Listed	Not Listed	Secure	S5
Running Pine	*Diphasiastrum digitatum*	Not Listed	Not Listed	Not Listed	Secure	N/A
Self-Heal	*Prunella vulgaris*	Not Listed	Not Listed	Not Listed	Secure	S5
Sensitive Fern	*Onoclea sensibilis*	Not Listed	Not Listed	Not Listed	Secure	S5
Serviceberry sp	*Amelanchier sp*	Not Listed	Not Listed	Not Listed	N/A	N/A
Shallow Sedge	*Carex lurida*	Not Listed	Not Listed	Not Listed	Secure	S5
Sheep-Laurel	*Kalmia angustifolia*	Not Listed	Not Listed	Not Listed	Secure	S5
Shining Fir-moss	*Huperzia lucidula*	Not Listed	Not Listed	Not Listed	Secure	S5
Shinleaf	*Pyrola elliptica*	Not Listed	Not Listed	Not Listed	Secure	S5
Skunk Currant	*Ribes glandulosum*	Not Listed	Not Listed	Not Listed	Secure	S5
Slender Rush	*Juncus tenuis*	Not Listed	Not Listed	Not Listed	Secure	S5
Small Bedstraw	*Galium tinctorium*	Not Listed	Not Listed	Not Listed	Secure	S5
Small Enchanter's Nightshade	*Circaea alpina*	Not Listed	Not Listed	Not Listed	Secure	S5
Small Sundrops	*Oenothera perennis*	Not Listed	Not Listed	Not Listed	Secure	S5
Smooth Blackberry	*Rubus canadensis*	Not Listed	Not Listed	Not Listed	Secure	S5
Soft Rush	*Juncus effusus*	Not Listed	Not Listed	Not Listed	Secure	S5
Speckled Alder	*Alnus incana*	Not Listed	Not Listed	Not Listed	Secure	S5
Spotted Coral-root	*Corallorhiza maculata*	Not Listed	Not Listed	Not Listed	Secure	S4
Spreading Dogbane	*Apocynum androsaemifolium*	Not Listed	Not Listed	Not Listed	Secure	S5
Stalk-Grain Sedge	*Carex stipata*	Not Listed	Not Listed	Not Listed	Secure	S5
Strict Blue-Eyed-Grass	*Sisyrinchium montanum*	Not Listed	Not Listed	Not Listed	Secure	S5
Striped Maple	*Acer pensylvanicum*	Not Listed	Not Listed	Not Listed	Secure	S5
Sugar Maple	*Acer saccharum*	Not Listed	Not Listed	Not Listed	Secure	S5
Swamp Loosestrife	*Lysimachia terrestris*	Not Listed	Not Listed	Not Listed	Secure	S5

Table E2: Plant Species Observed during 2016 Field Surveys, Ellershouse Wind Farm Expansion ***Project# 16-5807***

Common Name	Scientific Name	SARA Status	NSESA Status	COSEWIC Status	NSDNR Status	NS S-Rank
Sweet Fern	*Comptonia peregrina*	Not Listed	Not Listed	Not Listed	Secure	S5
Sweet Gale	*Myrica Gale*	Not Listed	Not Listed	Not Listed	Secure	S5
Tall Butter-Cup	*Ranunculus acris*	Not Listed	Not Listed	Not Listed	Exotic	SNA
Tall Meadow-Rue	*Thalictrum pubescens*	Not Listed	Not Listed	Not Listed	Secure	S5
Tawny Cotton-grass	*Eriophorum virginicum*	Not Listed	Not Listed	Not Listed	Secure	S5
Three-Leaved Rattlesnake-root	*Prenanthes trifoliolata*	Not Listed	Not Listed	Not Listed	Secure	S5
Three-Seed Sedge	*Carex trisperma*	Not Listed	Not Listed	Not Listed	Secure	S5
Toad Rush	*Juncus bufonius*	Not Listed	Not Listed	Not Listed	Secure	S5
Tufted Vetch	*Vicia cracca*	Not Listed	Not Listed	Not Listed	Exotic	SNA
Twinflower	*Linnaea borealis*	Not Listed	Not Listed	Not Listed	Secure	S5
Upright Yellow Wood-Sorrel	*Oxalis stricta*	Not Listed	Not Listed	Not Listed	Secure	S5
Velvetleaf Blueberry	*Vaccinium myrtilloides*	Not Listed	Not Listed	Not Listed	Secure	S5
Virginia Strawberry	*Fragaria virginiana*	Not Listed	Not Listed	Not Listed	Secure	S5
Water-horehound	*Lycopus uniflorus*	Not Listed	Not Listed	Not Listed	Secure	S5
White Ash	*Fraxinus americana*	Not Listed	Not Listed	Not Listed	Secure	S5
White Clover	*Trifolium repens*	Not Listed	Not Listed	Not Listed	Exotic	SNA
White Panicled American-Aster	*Symphyotrichum lanceolatum*	Not Listed	Not Listed	Not Listed	Secure	S4S5
White Spruce	*Picea glauca*	Not Listed	Not Listed	Not Listed	Secure	S5
White Sweet Clover	*Melilotus albus*	Not Listed	Not Listed	Not Listed	Exotic	SNA
White Turtlehead	*Chelone glabra*	Not Listed	Not Listed	Not Listed	Secure	S5
Wild Carrot	*Daucus carota*	Not Listed	Not Listed	Not Listed	Exotic	SNA
Wild Lily-of-The-Valley	*Maianthemum canadense*	Not Listed	Not Listed	Not Listed	Secure	S5
Wild Raisin	*Viburnum nudum*	Not Listed	Not Listed	Not Listed	Secure	S5
Wild Sarsaparilla	*Aralia nudicaulis*	Not Listed	Not Listed	Not Listed	Secure	S5
Willow-herb	*Epilobium ciliatum*	Not Listed	Not Listed	Not Listed	Secure	S5
Wood Aster	*Oclemena acuminata*	Not Listed	Not Listed	Not Listed	Secure	S5
Woodbine	*Parthenocissus quinquefolia*	Not Listed	Not Listed	Not Listed	Exotic	SNA
Wood-sorrel	*Oxalis acetosella*	Not Listed	Not Listed	Not Listed	N/A	N/A
Yarrow	*Achillea millefolium*	Not Listed	Not Listed	Not Listed	Secure	S5
Yellow Birch	*Betula alleghaniensis*	Not Listed	Not Listed	Not Listed	Secure	S5

APPENDIX F
MOOSE SURVEY METHODOLOGY

MOOSE SURVEY METHODOLOGY

Pellet count surveys are an effective method of documenting the mammalian fauna present in an area. These surveys were completed as part of the 2013 Environmental Assessment submission for the Ellershouse Wind Farm and consisted of assessing transects through the survey areas within that Project site. The survey areas were developed with consideration for the following:

- Coverage of the Project site: Survey areas were designed to cover as much of the Project site as possible.
- Habitat: Multiple habitats were targeted including mature softwood forest, mixed wood forest, wetlands, and clear cuts.
- Development footprint: Survey areas focused on land incorporating the development footprint (access roads and turbines), to the extent possible.
- Access to the Project site: The Project site incorporates a large tract of land which is accessible via logging roads. On-foot transects were designed to start and finish at existing logging roads/access roads.

Pellet Group Survey Methodology

Two pre-construction surveys were completed on May 24, 2013, and November 13, 2013 using the pellet group survey methodology. The surveys were conducted by a team of biologists with a demonstrable knowledge of mammalian animal sign. Survey areas were located across the Project site and included six triangular transects of 1.3 km, 1.3 km, 1.0 km, 0.9 km, 0.9 km and 0.9 km. Due to site layout changes between the first and second pellet group survey, the location of one transect (Transect 5a) was changed (to Transect 5b) to reflect the updated development footprint (Drawing 8.6). The distance of these two transects (Transects 5a and 5b) are approximately equal (0.9 km).

Transects were followed according to tracks laid out on GPS units and qualified biologists searched for pellet groups within approximately 2-3 m on either side of the transect line. All wildlife sign, including tracks, foraging sign, scat, and rubs, encountered during the surveys were identified to species, where possible. In addition, the locations of all noteworthy observations were recorded using GPS receivers capable of sub 5 m accuracy, with representative photos taken.

Of the seven transects completed during the 2013 pellet count surveys, three were located within the proposed expansion area and the remaining four transects were located within 1 km of the expansion area. Due to the close proximity of the previous surveys, consistent habitat cover and connectivity to the proposed Project site, the results gathered in 2013 are deemed representative of the conditions to be expected within the proposed Project site.

APPENDIX G
BIRD SURVEY METHODOLOGY AND FIELD DATA RESULTS

Pre-construction (baseline) avian field surveys were completed to complement desktop information and to characterize the pre-construction (baseline) bird community at the Project site throughout the year. These surveys were carried out by an expert birder and were designed with the purpose of collecting data on species presence, abundance, and habitat usage at the Project site during the months coinciding with fall migration, spring migration, breeding season, and the winter season. All field surveys were designed to conform to protocols outlined in the document "Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds" (CWS 2007).

Surveys were completed in April, May, June, September, October, November, and December 2013. The following information was recorded at each survey location:

- Weather conditions (temperature, wind speed, cloud cover, and presence of precipitation);
- Date and time of day;
- Habitat description; and
- GPS coordinates of the survey location.

Surveys employed point count, area search, and stopover count methodologies depending on the season and target species. Regardless of survey methodology, the following elements were consistent among surveys:

- surveys were four hours in duration, commencing as close to sunrise as possible;
- species presence and abundance were recorded based on visual and acoustic observations;
- approximate distance to each bird was recorded using a scale of 0-50 m, 50-100 m and further than 100 m;
- behavioural patterns were noted to determine whether birds flying over the site would be within the future blade-swept area of a turbine; and
- survey locations during each survey were separated by a minimum distance of 300 m, whenever possible, to account for all present habitat types throughout the Project site.

REFERENCES

CWS (Canadian Wildlife Service). 2007. Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds. 33 pp.

Date	Location	Coordinates (UTM NAD83)	Habitat	Conditions				Time	Common Name	Number Observed	Distance to Observer (m)	Flyover
				Wind Speed and Direction	Temperature °C	Sky	Precipitation					
29-Apr-13	ST1	0418951; 4975948	Mid aged mixed wood near clearcut	low	11	Cloudy	None	5:38 AM	American Robin	2	0-50	...
...	...	...	...	...	...	...	...	...	American Robin	3	50-100	...
...	...	...	...	...	...	...	...	...	American Robin	4	100+	...
...	...	...	...	...	...	...	...	...	Barred Owl	2	100+	...
...	...	...	...	...	...	...	...	...	Black-capped Chickadee	1	100+	...
...	...	...	...	...	...	...	...	...	Dark-eyed Junco	1	50-100	...
...	...	...	...	...	...	...	...	...	Hermit Thrush	1	100+	...
...	...	...	...	...	...	...	...	...	Hermit Thrush	2	100+	...
...	...	...	...	...	...	...	...	...	Ruffed Grouse	1	100+	...
...	...	...	...	...	...	...	...	...	Song sparrow	3	50-100	...
...	...	...	...	...	...	...	...	...	White-throated Sparrow	1	0-50	...
...	...	...	...	...	...	...	...	...	White-throated Sparrow	2	50-100	...
...	...	...	...	...	...	...	...	...	White-throated Sparrow	2	100+	...
...	ST2	0419968; 4975681	Early to mid aged mixed wood	low	11	Cloudy	None	5:57 AM	American Robin	2	100+	...
...	...	...	...	...	...	...	...	...	American Robin	1	50-100	...
...	...	...	...	...	...	...	...	...	Dark-eyed Junco	1	0-50	...
...	...	...	...	...	...	...	...	...	Dark-eyed Junco	1	50-100	...
...	...	...	...	...	...	...	...	...	Evening Grosbeak	...	...	1 2 at 50m to north
...	...	...	...	...	...	...	...	...	Hermit Thrush	3	50-100	...
...	...	...	...	...	...	...	...	...	Hermit Thrush	1	100+	...
...	...	...	...	...	...	...	...	...	Ruby-crowned Kinglet	1	50-100	...
...	...	...	...	...	...	...	...	...	Ruffed Grouse	1	50-100	...
...	...	...	...	...	...	...	...	...	White-throated Sparrow	1	0-50	...
...	...	...	...	...	...	...	...	...	Yellow-rumped Warbler	1	0-50	...
...	ST3	0420675; 4975670	Mid-aged to mature mixed wood	low	11	Cloudy	None	6:15 AM	American Robin	2	50-100	...
...	...	...	...	...	...	...	...	...	Dark-eyed Junco	1	50-100	...
...	...	...	...	...	...	...	...	...	Dark-eyed Junco	2	100+	...
...	...	...	...	...	...	...	...	...	Evening Grosbeak	1	100+	...
...	...	...	...	...	...	...	...	...	Hermit Thrush	3	100+	...
...	...	...	...	...	...	...	...	...	Northern Flicker	1	100+	...
...	...	...	...	...	...	...	...	...	Purple Finch	1	100+	...
...	...	...	...	...	...	...	...	...	White-throated Sparrow	1	100+	...
...	ST4	0419782; 4975021	Mature hardwood	low	11	Cloudy	None	6:31 AM	American Robin	1	50-100	...
...	...	...	...	...	...	...	...	...	Black-capped Chickadee	2	0-50	...
...	...	...	...	...	...	...	...	...	Blue Jay	2	100+	...
...	...	...	...	...	...	...	...	...	Downy Woodpecker	1	0-50	...
...	...	...	...	...	...	...	...	...	Hermit Thrush	1	0-50	...
...	...	...	...	...	...	...	...	...	Hermit Thrush	1	50-100	...
...	...	...	...	...	...	...	...	...	Northern Flicker	1	0-50	...
...	...	...	...	...	...	...	...	...	Northern Flicker	1	50-100	...
...	...	...	...	...	...	...	...	...	Purple Finch	1	50-100	...
...	...	...	...	...	...	...	...	...	Ruby-crowned Kinglet	1	100+	...
...	...	...	...	...	...	...	...	...	Song sparrow	1	50-100	...
...	...	...	...	...	...	...	...	...	Yellow-rumped Warbler	1	0-50	...
...	...	...	...	...	...	...	...	...	Yellow-rumped Warbler	1	50-100	...
...	ST5	0420311; 4975001	Early successional mixed wood near watercourse	low	11	Cloudy	None	6:50 AM	American Robin	1	50-100	...
...	...	...	...	...	...	...	...	...	Black-capped Chickadee	1	50-100	...
...	...	...	...	...	...	...	...	...	Blue Jay	1	100+	...

Date	Location	Coordinates (UTM NAD83)	Habitat	Conditions				Time	Common Name	Number Observed	Distance to Observer (m)	Flyover
				Wind Speed and Direction	Temperature °C	Sky	Precipitation					
...	...	...	...	...	...	...	...	...	Golden-crowned Kinglet	1	0-50	...
...	...	...	...	...	...	...	...	...	Hermit Thrush	2	50-100	...
...	...	...	...	...	...	...	...	...	Palm Warbler	1	50-100	...
...	...	...	...	...	...	...	...	...	Purple Finch	2	100+	...
...	...	...	...	...	...	...	...	...	Ruby-crowned Kinglet	1	0-50	...
...	...	...	...	...	...	...	...	...	Ruffed Grouse	1	100+	...
...	...	...	...	...	...	...	...	...	Swamp Sparrow	1	50-100	...
...	...	...	...	...	...	...	...	...	White-throated Sparrow	2	100+	...
...	...	...	...	...	...	...	...	...	White-throated Sparrow	1	50-100	...
...	...	...	...	...	...	...	...	...	Winter Wren	1	50-100	...
...	ST6	0420568; 4975187	swamp surrounded by mature mixed wood forrest	low	11	Cloudy	None	7:14 AM	American Robin	1	0-50	...
...	...	...	...	...	...	...	...	...	American Robin	2	100+	...
...	...	...	...	...	...	...	...	...	American Robin	1	50-100	...
...	...	...	...	...	...	...	...	...	Blue Jay	2	100+	...
...	...	...	...	...	...	...	...	...	Dark-eyed Junco	1	0-50	...
...	...	...	...	...	...	...	...	...	Evening Grosbeak	...	...	2 at 50m to north
...	...	...	...	...	...	...	...	...	Golden-crowned Kinglet	1	0-50	...
...	...	...	...	...	...	...	...	...	Hermit Thrush	1	100+	...
...	...	...	...	...	...	...	...	...	Mourning Dove	...	...	1 at 50m to northeast
...	...	...	...	...	...	...	...	...	Northern Flicker	1	100+	...
...	...	...	...	...	...	...	...	...	Palm Warbler	3	50-100	...
...	...	...	...	...	...	...	...	...	Palm Warbler	2	100+	...
...	...	...	...	...	...	...	...	...	Purple Finch	1	50-100	...
...	...	...	...	...	...	...	...	...	Ruffed Grouse	1	100+	...
...	...	...	...	...	...	...	...	...	Swamp Sparrow	2	50-100	...
...	...	...	...	...	...	...	...	...	Swamp Sparrow	1	100+	...
...	...	...	...	...	...	...	...	...	White-throated Sparrow	2	100+	...
...	...	...	...	...	...	...	...	...	Winter Wren	1	50-100	...
...	...	...	...	...	...	...	...	...	Winter Wren	1	100+	...
...	...	...	...	...	...	...	...	...	Yellow-rumped Warbler	1	50-100	...
...	ST9	0419425; 4974246	Mid to mature aged mixed wood in valley near cutover	Low	12	clear	None	8:28 AM	American Robin	2	100+	...
...	...	...	...	...	...	...	...	...	Black-capped Chickadee	2	0-50	...
...	...	...	...	...	...	...	...	...	Blue Jay	2	100+	...
...	...	...	...	...	...	...	...	...	Dark-eyed Junco	1	50-100	...
...	...	...	...	...	...	...	...	...	Hermit Thrush	1	100+	...
...	...	...	...	...	...	...	...	...	Palm Warbler	1	50-100	...
...	...	...	...	...	...	...	...	...	Red-tailed Hawk	1	100+	...
...	...	...	...	...	...	...	...	...	White-throated Sparrow	2	0-50	...
...	...	...	...	...	...	...	...	...	White-throated Sparrow	2	100+	...
...	...	...	...	...	...	...	...	...	Yellow-rumped Warbler	1	50-100	...
...	...	...	...	...	...	...	...	...	Yellow-rumped Warbler	1	100+	...
...	ST11	0418829; 4974567	Early to mid aged mixed wood	Low	12	clear	None	9:03 AM	American Goldfinch	1	50-100	...
...	...	...	...	...	...	...	...	...	Black-capped Chickadee	1	0-50	...
...	...	...	...	...	...	...	...	...	Blue Jay	1	100+	...
...	...	...	...	...	...	...	...	...	Hermit Thrush	1	100+	...
...	...	...	...	...	...	...	...	...	Ruby-crowned Kinglet	1	100+	...
...	...	...	...	...	...	...	...	...	Yellow-rumped Warbler	2	50-100	...

Date	Location	Coordinates (UTM NAD83)	Habitat	Conditions				Time	Common Name	Number Observed	Distance to Observer (m)	Flyover
				Wind Speed and Direction	Temperature °C	Sky	Precipitation					
5-May-13	ST1	0418951; 4975948	Mid aged mixed wood near clearcut	10 km with gusts to 30, blowing west	11	Overcast	None	5:32 AM	American Robin	2	50-100	…
…	…	…	…	…	…	…	…	…	Black-and-white Warbler	1	0-50	…
…	…	…	…	…	…	…	…	…	Black-capped Chickadee	3	0-50	…
…	…	…	…	…	…	…	…	…	Hermit Thrush	1	50-100	…
…	…	…	…	…	…	…	…	…	Palm Warbler	2	50-100	…
…	…	…	…	…	…	…	…	…	Ruffed grouse	1	50-100	…
…	…	…	…	…	…	…	…	…	White-throated Sparrow	3	0-50	…
…	…	…	…	…	…	…	…	…	White-throated Sparrow	5	50-100	…
…	…	…	…	…	…	…	…	…	White-throated Sparrow	4	100+	…
…	…	…	…	…	…	…	…	…	Yellow-rumped Warbler	2	0-50	…
…	…	…	…	…	…	…	…	…	Yellow-rumped Warbler	1	50-100	…
…	ST2	0419968; 4975681	Early to mid aged mixed wood	10 km with gusts to 30, blowing west	11	Overcast	None	5:55 AM	American Goldfinch	1	0-50	…
…	…	…	…	…	…	…	…	…	American Robin	1	0-50	…
…	…	…	…	…	…	…	…	…	American Robin	1	50-100	…
…	…	…	…	…	…	…	…	…	American Robin	1	100+	…
…	…	…	…	…	…	…	…	…	Black-capped Chickadee	1	50-100	…
…	…	…	…	…	…	…	…	…	Hermit Thrush	1	50-100	…
…	…	…	…	…	…	…	…	…	Mourning Dove	1	100+	…
…	…	…	…	…	…	…	…	…	Nashville Warbler	1	0-50	…
…	…	…	…	…	…	…	…	…	Nashville Warbler	1	50-100	…
…	…	…	…	…	…	…	…	…	Palm Warbler	2	50-100	…
…	…	…	…	…	…	…	…	…	Purple Finch	1	50-100	…
…	…	…	…	…	…	…	…	…	Ruby-crowned Kinglet	1	100+	…
…	…	…	…	…	…	…	…	…	Ruffed grouse	1	0-50	…
…	…	…	…	…	…	…	…	…	White-throated Sparrow	1	0-50	…
…	…	…	…	…	…	…	…	…	White-throated Sparrow	1	100+	…
…	…	…	…	…	…	…	…	…	Winter Wren	1	100+	…
…	…	…	…	…	…	…	…	…	Yellow-rumped Warbler	1	0-50	…
…	…	…	…	…	…	…	…	…	Yellow-rumped Warbler	1	50-100	…
…	ST3	0420675; 4975670	Mid-aged to mature mixed wood	10 km with gusts to 30, blowing west	11	Cloudy	None	8:52 AM	American Goldfinch	1	100+	…
…	…	…	…	…	…	…	…	…	American Robin	3	100+	…
…	…	…	…	…	…	…	…	…	Black-capped Chickadee	2	50-100	…
…	…	…	…	…	…	…	…	…	Black-throated Green Warbler	1	0-50	…
…	…	…	…	…	…	…	…	…	Black-throated Green Warbler	2	50-100	…
…	…	…	…	…	…	…	…	…	Black-throated Green Warbler	2	100+	…
…	…	…	…	…	…	…	…	…	Blue Jay	2	100+	…
…	…	…	…	…	…	…	…	…	Blue-headed Vireo	1	50-100	…
…	…	…	…	…	…	…	…	…	Blue-headed Vireo	1	100+	…
…	…	…	…	…	…	…	…	…	Downy Woodpecker	1	100+	…
…	…	…	…	…	…	…	…	…	Golden-crowned Kinglet	1	100+	…
…	…	…	…	…	…	…	…	…	Mourning Dove	1	100+	…
…	…	…	…	…	…	…	…	…	Nashville Warbler	1	50-100	…
…	…	…	…	…	…	…	…	…	Nashville Warbler	1	100+	…
…	…	…	…	…	…	…	…	…	Purple Finch	1	100+	…
…	…	…	…	…	…	…	…	…	White-throated Sparrow	2	100+	…
…	…	…	…	…	…	…	…	…	Winter Wren	1	100+	…
…	…	…	…	…	…	…	…	…	Yellow-rumped Warbler	1	50-100	…

Date	Location	Coordinates (UTM NAD83)	Habitat	Conditions				Time	Common Name	Number Observed	Distance to Observer (m)	Flyover
				Wind Speed and Direction	Temperature °C	Sky	Precipitation					
…	ST4	0419782; 4975021	Mature hardwood	10 km with gusts to 30, blowing west	11	Overcast	None	6:09 AM	American Robin	2	0-50	…
…	…	…	…	…	…	…	…	…	Black-and-white Warbler	1	50-100	…
…	…	…	…	…	…	…	…	…	Black-throated Blue Warbler	1	0-50	…
…	…	…	…	…	…	…	…	…	Blue-headed Vireo	1	50-100	…
…	…	…	…	…	…	…	…	…	Blue-headed Vireo	1	100+	…
…	…	…	…	…	…	…	…	…	Dark-eyed Junco	1	0-50	…
…	…	…	…	…	…	…	…	…	Dark-eyed Junco	1	50-100	…
…	…	…	…	…	…	…	…	…	Hermit Thrush	2	100+	…
…	…	…	…	…	…	…	…	…	Nashville Warbler	1	0-50	…
…	…	…	…	…	…	…	…	…	Purple Finch	2	50-100	…
…	…	…	…	…	…	…	…	…	Purple Finch	1	100+	…
…	…	…	…	…	…	…	…	…	White-throated Sparrow	1	0-50	…
…	…	…	…	…	…	…	…	…	White-throated Sparrow	2	100+	…
…	…	…	…	…	…	…	…	…	Winter Wren	1	100+	…
…	…	…	…	…	…	…	…	…	Yellow-rumped Warbler	1	0-50	…
…	…	…	…	…	…	…	…	…	Yellow-rumped Warbler	1	50-100	…
…	ST5	0420311; 4975001	Early successional mixed wood near watercourse	10 km with gusts to 30, blowing west	11	Overcast	None	7:32 AM	American Goldfinch	1	50-100	…
…	…	…	…	…	…	…	…	…	American Robin	1	100+	…
…	…	…	…	…	…	…	…	…	Black-and-white Warbler	1	50-100	…
…	…	…	…	…	…	…	…	…	Black-throated Green Warbler	1	50-100	…
…	…	…	…	…	…	…	…	…	Blue Jay	1	100+	…
…	…	…	…	…	…	…	…	…	Mourning Dove	2	100+	…
…	…	…	…	…	…	…	…	…	Northern Flicker	1	100+	…
…	…	…	…	…	…	…	…	…	Northern Parula	1	100+	…
…	…	…	…	…	…	…	…	…	Ruby-crowned Kinglet	1	100+	…
…	…	…	…	…	…	…	…	…	White-throated Sparrow	1	0-50	…
…	…	…	…	…	…	…	…	…	White-throated Sparrow	1	50-100	…
…	…	…	…	…	…	…	…	…	White-throated Sparrow	1	100+	…
…	…	…	…	…	…	…	…	…	Yellow-rumped Warbler	1	50-100	…
…	ST6	0420568; 4975187	swamp surrounded by mature mixed wood forrest	low	13	Cloudy	None	7:50 AM	Black-and-white Warbler	1	50-100	…
…	…	…	…	…	…	…	…	…	Black-capped Chickadee	2	50-100	…
…	…	…	…	…	…	…	…	…	Black-throated Green Warbler	1	50-100	…
…	…	…	…	…	…	…	…	…	Black-throated Green Warbler	1	100+	…
…	…	…	…	…	…	…	…	…	Blue Jay	1	50-100	…
…	…	…	…	…	…	…	…	…	Blue-headed Vireo	1	50-100	…
…	…	…	…	…	…	…	…	…	Dark-eyed Junco	1	50-100	…
…	…	…	…	…	…	…	…	…	Golden-crowned Kinglet	1	50-100	…
…	…	…	…	…	…	…	…	…	Nashville Warbler	1	50-100	…
…	…	…	…	…	…	…	…	…	Ovenbird	1	100+	…
…	…	…	…	…	…	…	…	…	Palm Warbler	1	50-100	…
…	…	…	…	…	…	…	…	…	Ruby-crowned Kinglet	1	100+	…
…	…	…	…	…	…	…	…	…	Ruffed grouse	1	100+	…
…	…	…	…	…	…	…	…	…	Song sparrow	1	100+	…
…	…	…	…	…	…	…	…	…	Swamp Sparrow	2	50-100	…
…	…	…	…	…	…	…	…	…	White-throated Sparrow	1	0-50	…
…	…	…	…	…	…	…	…	…	White-throated Sparrow	1	50-100	…

Date	Location	Coordinates (UTM NAD83)	Habitat	Conditions				Time	Common Name	Number Observed	Distance to Observer (m)	Flyover
				Wind Speed and Direction	Temperature °C	Sky	Precipitation					
...	...	...	...	...	...	...	...	...	Yellow-rumped Warbler	2	50-100	...
...	ST9	0419425; 4974246	Mid to mature aged mixed wood in valley near cutover	10 km with gusts to 30, blowing west	11	Overcast	None	6:56 AM	American Robin	1	50-100	...
...	...	...	...	...	...	...	...	...	American Robin	1	100+	...
...	...	...	...	...	...	...	...	...	Black-and-white Warbler	1	0-50	...
...	...	...	...	...	...	...	...	...	Black-throated Green Warbler	2	50-100	...
...	...	...	...	...	...	...	...	...	Dark-eyed Junco	1	50-100	...
...	...	...	...	...	...	...	...	...	Golden-crowned Kinglet	2	0-50	...
...	...	...	...	...	...	...	...	...	Hermit Thrush	1	50-100	...
...	...	...	...	...	...	...	...	...	Northern Flicker	1	100+	...
...	...	...	...	...	...	...	...	...	Palm Warbler	1	50-100	...
...	...	...	...	...	...	...	...	...	Pine Siskin	1	50-100	...
...	...	...	...	...	...	...	...	...	Ruffed grouse	1	100+	...
...	...	...	...	...	...	...	...	...	White-throated Sparrow	1	100+	...
...	...	...	...	...	...	...	...	...	Yellow-rumped Warbler	1	50-100	...
...	...	...	...	...	...	...	...	...	Yellow-rumped Warbler	1	100+	...
...	ST11	0418829; 4974567	Early to mid aged mixed wood	10 km with gusts to 30, blowing west	11	Overcast	None	6:27 AM	American Goldfinch	1	50-100	...
...	...	...	...	...	...	...	...	...	Black-and-white Warbler	1	0-50	...
...	...	...	...	...	...	...	...	...	Northern Flicker	1	100+	...
...	...	...	...	...	...	...	...	...	Palm Warbler	1	0-50	...
...	...	...	...	...	...	...	...	...	Palm Warbler	1	50-100	...
...	...	...	...	...	...	...	...	...	Purple Finch	1	0-50	...
...	...	...	...	...	...	...	...	...	Ruby-crowned Kinglet	1	100+	...
...	...	...	...	...	...	...	...	...	White-throated Sparrow	2	50-100	...
...	...	...	...	...	...	...	...	...	White-throated Sparrow	2	100+	...
...	...	...	...	...	...	...	...	...	Winter Wren	1	50-100	...
...	...	...	...	...	...	...	...	...	Yellow-rumped Warbler	1	50-100	...
...	...	...	...	...	...	...	...	...	Yellow-rumped Warbler	1	100+	...
31-May-13	ST1	0418951; 4975948	Mid aged mixed wood near clearcut	Low	18	clear	None	5:09 AM	American Robin	2	100+	...
...	...	...	...	...	...	...	...	...	Alder Flycatcher	1	50-100	...
...	...	...	...	...	...	...	...	...	Alder Flycatcher	1	100+	...
...	...	...	...	...	...	...	...	...	Black-throated Blue Warbler	1	0-50	...
...	...	...	...	...	...	...	...	...	Black-throated Blue Warbler	1	50-100	...
...	...	...	...	...	...	...	...	...	Black-throated Green Warbler	1	100+	...
...	...	...	...	...	...	...	...	...	Chestnut-sided Warbler	1	50-100	...
...	...	...	...	...	...	...	...	...	Common Yellowthroat	2	50-100	...
...	...	...	...	...	...	...	...	...	Hermit Thrush	1	100+	...
...	...	...	...	...	...	...	...	...	Magnolia Warbler	2	50-100	...
...	...	...	...	...	...	...	...	...	Magnolia Warbler	1	100+	...
...	...	...	...	...	...	...	...	...	Northern Parula	2	0-50	...
...	...	...	...	...	...	...	...	...	Northern Parula	1	50-100	...
...	...	...	...	...	...	...	...	...	Ovenbird	2	0-50	...
...	...	...	...	...	...	...	...	...	Ovenbird	1	50-100	...
...	...	...	...	...	...	...	...	...	Song sparrow	1	0-50	...
...	...	...	...	...	...	...	...	...	White-throated Sparrow	3	100+	...
...	...	...	...	...	...	...	...	...	Yellow-bellied Sapsucker	1	100+	...
...	...	...	...	...	...	...	...	...	Yellow-rumped Warbler	1	50-100	...

Date	Location	Coordinates (UTM NAD83)	Habitat	Conditions				Time	Common Name	Number Observed	Distance to Observer (m)	Flyover
				Wind Speed and Direction	Temperature °C	Sky	Precipitation					
…	ST2	0419968; 4975681	Early to mid aged mixed wood	Low	18	clear	None	5:23 AM	American Crow	1	100+	…
…	…	…	…	…	…	…	…	…	American Goldfinch	1	100+	…
…	…	…	…	…	…	…	…	…	American Robin	1	0-50	…
…	…	…	…	…	…	…	…	…	Black-and-white Warbler	2	0-50	…
…	…	…	…	…	…	…	…	…	Black-capped Chickadee	2	50-100	…
…	…	…	…	…	…	…	…	…	Black-throated Green Warbler	1	50-100	…
…	…	…	…	…	…	…	…	…	Dark-eyed Junco	1	0-100	…
…	…	…	…	…	…	…	…	…	Hermit Thrush	1	0-50	…
…	…	…	…	…	…	…	…	…	Hermit Thrush	3	100+	…
…	…	…	…	…	…	…	…	…	Ovenbird	2	0-50	…
…	…	…	…	…	…	…	…	…	Ovenbird	2	50-100	…
…	…	…	…	…	…	…	…	…	Ovenbird	2	100+	…
…	…	…	…	…	…	…	…	…	Purple Finch	1	50-100	…
…	…	…	…	…	…	…	…	…	Winter Wren	1	100+	…
…	…	…	…	…	…	…	…	…	Yellow-rumped Warbler	1	50-100	…
…	ST3	0420675; 4975670	Mid-aged to mature mixed wood	Low	18	clear	None	7:20 AM	Chestnut-sided Warbler	1	50-100	…
…	…	…	…	…	…	…	…	…	Alder Flycatcher	1	100+	…
…	…	…	…	…	…	…	…	…	American Redstart	1	0-50	…
…	…	…	…	…	…	…	…	…	American Robin	1	100+	…
…	…	…	…	…	…	…	…	…	Black-and-white Warbler	1	0-50	…
…	…	…	…	…	…	…	…	…	Black-and-white Warbler	1	50-100	…
…	…	…	…	…	…	…	…	…	Blackburnian Warbler	1	50-100	…
…	…	…	…	…	…	…	…	…	Black-throated Green Warbler	1	50-100	…
…	…	…	…	…	…	…	…	…	Blue-headed Vireo	1	50-100	…
…	…	…	…	…	…	…	…	…	Common Yellowthroat	1	50-100	…
…	…	…	…	…	…	…	…	…	Golden-crowned Kinglet	1	50-100	…
…	…	…	…	…	…	…	…	…	Hermit Thrush	1	100+	…
…	…	…	…	…	…	…	…	…	Ovenbird	1	50-100	…
…	…	…	…	…	…	…	…	…	Ovenbird	1	100+	…
…	…	…	…	…	…	…	…	…	Yellow-rumped Warbler	1	50-100	…
…	ST4	0419782; 4975021	Mature hardwood	Low	18	clear	None	5:35 AM	American Redstart	2	50-100	…
…	…	…	…	…	…	…	…	…	American Robin	2	0-50	…
…	…	…	…	…	…	…	…	…	American Robin	1	50-100	…
…	…	…	…	…	…	…	…	…	American Robin	1	100+	…
…	…	…	…	…	…	…	…	…	Black-and-white Warbler	2	50-100	…
…	…	…	…	…	…	…	…	…	Black-throated Blue Warbler	1	50-100	…
…	…	…	…	…	…	…	…	…	Black-throated Green Warbler	1	0-50	…
…	…	…	…	…	…	…	…	…	Black-throated Green Warbler	1	50-100	…
…	…	…	…	…	…	…	…	…	Blue Jay	2	100+	…
…	…	…	…	…	…	…	…	…	Chestnut-sided Warbler	1	50-100	…
…	…	…	…	…	…	…	…	…	Common Yellowthroat	1	50-100	…
…	…	…	…	…	…	…	…	…	Common Yellowthroat	1	100+	…
…	…	…	…	…	…	…	…	…	Gray Jay	1	0-50	…
…	…	…	…	…	…	…	…	…	Hermit Thrush	1	100+	…
…	…	…	…	…	…	…	…	…	Magnolia Warbler	1	50-100	…
…	…	…	…	…	…	…	…	…	Ovenbird	1	50-100	…
…	…	…	…	…	…	…	…	…	Ovenbird	1	100+	…
…	…	…	…	…	…	…	…	…	Red-eyed Vireo	1	100+	…

Date	Location	Coordinates (UTM NAD83)	Habitat	Conditions				Time	Common Name	Number Observed	Distance to Observer (m)	Flyover
				Wind Speed and Direction	Temperature °C	Sky	Precipitation					
...	...	...	...	...	...	...	...	...	White-throated Sparrow	1	0-50	...
...	...	...	...	...	...	...	...	...	White-throated Sparrow	1	100+	...
...	...	...	...	...	...	...	...	...	Winter Wren	1	50-100	...
...	ST5	0420311; 4975001	Early successional mixed wood near watercourse	Low	18	clear	None	5:52 AM	Black-and-white Warbler	1	50-100	...
...	...	...	...	...	...	...	...	...	Blackburnian Warbler	1	0-50	...
...	...	...	...	...	...	...	...	...	Blackburnian Warbler	1	50-100	...
...	...	...	...	...	...	...	...	...	Black-throated Blue Warbler	1	50-100	...
...	...	...	...	...	...	...	...	...	Black-throated Green Warbler	3	0-50	...
...	...	...	...	...	...	...	...	...	Black-throated Green Warbler	1	50-100	...
...	...	...	...	...	...	...	...	...	Blue-headed Vireo	1	100+	...
...	...	...	...	...	...	...	...	...	Canada Warbler	1	50-100	...
...	...	...	...	...	...	...	...	...	Hermit Thrush	1	0-50	...
...	...	...	...	...	...	...	...	...	Hermit Thrush	1	100+	...
...	...	...	...	...	...	...	...	...	Magnolia Warbler	1	100+	...
...	...	...	...	...	...	...	...	...	Ovenbird	1	0-50	...
...	...	...	...	...	...	...	...	...	Ovenbird	1	50-100	...
...	...	...	...	...	...	...	...	...	Swainson's Thrush	1	100+	...
...	...	...	...	...	...	...	...	...	White-throated Sparrow	1	0-50	...
...	...	...	...	...	...	...	...	...	Winter Wren	1	100+	...
...	...	...	...	...	...	...	...	...	Yellow-bellied Sapsucker	1	0-50	...
...	ST6	0420568; 4975187	swamp surrounded by mature mixed wood forrest	Low	18	clear	None	6:12 AM	Black-and-white Warbler	1	50-100	...
...	...	...	...	...	...	...	...	...	Blue-headed Vireo	1	100+	...
...	...	...	...	...	...	...	...	...	Common Yellowthroat	1	0-50	...
...	...	...	...	...	...	...	...	...	Hairy Woodpecker	1	100+	...
...	...	...	...	...	...	...	...	...	Magnolia Warbler	1	0-50	...
...	...	...	...	...	...	...	...	...	Magnolia Warbler	1	50-100	...
...	...	...	...	...	...	...	...	...	Northern Parula	1	50-100	...
...	...	...	...	...	...	...	...	...	Ovenbird	1	50-100	...
...	...	...	...	...	...	...	...	...	Ovenbird	1	100+	...
...	...	...	...	...	...	...	...	...	Red-eyed Vireo	1	50-100	...
...	...	...	...	...	...	...	...	...	Swainson's Thrush	1	100+	...
...	...	...	...	...	...	...	...	...	Swamp Sparrow	2	50-100	...
...	...	...	...	...	...	...	...	...	White-throated Sparrow	2	100+	...
...	...	...	...	...	...	...	...	...	Winter Wren	1	100+	...
...	...	...	...	...	...	...	...	...	Yellow-bellied Flycatcher	1	0-50	...
...	ST9	0419425; 4974246	Mid to mature aged mixed wood in valley near cutover	Low	21	clear	None	8:09 AM	American Robin	1	100+	...
...	...	...	...	...	...	...	...	...	Black-and-white Warbler	1	50-100	...
...	...	...	...	...	...	...	...	...	Black-throated Blue Warbler	2	50-100	...
...	...	...	...	...	...	...	...	...	Black-throated Green Warbler	1	100+	...
...	...	...	...	...	...	...	...	...	Blue Jay	1	100+	...
...	...	...	...	...	...	...	...	...	Dark-eyed Junco	1	50-100	...
...	...	...	...	...	...	...	...	...	Dark-eyed Junco	1	100+	...
...	...	...	...	...	...	...	...	...	Hermit Thrush	1	100+	...
...	...	...	...	...	...	...	...	...	Magnolia Warbler	1	0-50	...
...	...	...	...	...	...	...	...	...	Magnolia Warbler	2	50-100	...
...	...	...	...	...	...	...	...	...	Magnolia Warbler	1	100+	...

Date	Location	Coordinates (UTM NAD83)	Habitat	Conditions				Time	Common Name	Number Observed	Distance to Observer (m)	Flyover
				Wind Speed and Direction	Temperature °C	Sky	Precipitation					
…	…	…	…	…	…	…	…	…	Nashville Warbler	1	50-100	…
…	…	…	…	…	…	…	…	…	Northern Parula	1	50-100	…
…	…	…	…	…	…	…	…	…	Ovenbird	2	100+	…
…	…	…	…	…	…	…	…	…	Ruffed grouse	1	0-50	…
…	…	…	…	…	…	…	…	…	Sharp-shinned Hawk	1	100+	…
…	…	…	…	…	…	…	…	…	White-throated Sparrow	1	50-100	…
…	…	…	…	…	…	…	…	…	White-throated Sparrow	1	100+	…
…	ST11	0418829; 4974567	Early to mid aged mixed wood	Low	21	clear	None	7:52 AM	Alder Flycatcher	1	50-100	…
…	…	…	…	…	…	…	…	…	Black-throated Blue Warbler	1	50-100	…
…	…	…	…	…	…	…	…	…	Black-and-white Warbler	1	50-100	…
…	…	…	…	…	…	…	…	…	Black-throated Blue Warbler	1	50-100	…
…	…	…	…	…	…	…	…	…	Cedar Waxwing	4	0-50	…
…	…	…	…	…	…	…	…	…	Common Yellowthroat	1	50-100	…
…	…	…	…	…	…	…	…	…	Nashville Warbler	1	0-50	…
…	…	…	…	…	…	…	…	…	Ovenbird	1	50-100	…
…	…	…	…	…	…	…	…	…	White-throated Sparrow	2	100+	…

Table G2: Project Site Spring Migration Surveys, Results Summary, Ellershouse Wind Farm *Project # 16-5807*

Common Name	Scientific Name	SARA Status	NSESA Status	COSEWIC Status	NSDNR Status	NS S-Rank	Number of Observations	Number of Individuals Observed
Alder Flycatcher	*Empidonax alnorum*	Not Listed	Not Listed	Not Listed	Secure	S5B	4	4
American Crow	*Corvus brachyrhynchos*	Not Listed	Not Listed	Not Listed	Secure	S5	1	1
American Goldfinch	*Spinus tristis*	Not Listed	Not Listed	Not Listed	Secure	S5	6	6
American Redstart	*Setophaga ruticilla*	Not Listed	Not Listed	Not Listed	Secure	S5B	2	3
American Robin	*Turdus migratorius*	Not Listed	Not Listed	Not Listed	Secure	S5B	28	44
Barred Owl	*Strix varia*	Not Listed	Not Listed	Not Listed	Secure	S5	1	2
Black-and-white Warbler	*Mniotilta varia*	Not Listed	Not Listed	Not Listed	Secure	S4S5B	14	16
Blackburnian Warbler	*Dendroica fusca*	Not Listed	Not Listed	Not Listed	Secure	S4B	3	3
Black-capped Chickadee	*Poecile atricapillus*	Not Listed	Not Listed	Not Listed	Secure	S5	10	17
Black-throated Blue Warbler	*Dendroica caerulescens*	Not Listed	Not Listed	Not Listed	Secure	S5B	8	9
Black-throated Green Warbler	*Dendroica virens*	Not Listed	Not Listed	Not Listed	Secure	S4S5B	15	20
Blue Jay	*Cyanocitta cristata*	Not Listed	Not Listed	Not Listed	Secure	S5	10	15
Blue-headed Vireo	*Vireo solitarius*	Not Listed	Not Listed	Not Listed	Secure	S5B	8	8
Canada Warbler	*Wilsonia canadensis*	Threatened	Endangered	Threatened	At Risk	S3B	1	1
Cedar Waxwing	*Bombycilla cedrorum*	Not Listed	Not Listed	Not Listed	Secure	S5B	1	4
Chestnut-sided Warbler	*Dendroica pensylvanica*	Not Listed	Not Listed	Not Listed	Secure	S5B	3	3
Common Yellowthroat	*Geothlypis trichas*	Not Listed	Not Listed	Not Listed	Secure	S5B	6	7
Dark-eyed Junco	*Junco hyemalis*	Not Listed	Not Listed	Not Listed	Secure	S4S5	14	15
Downy Woodpecker	*Picoides pubescens*	Not Listed	Not Listed	Not Listed	Secure	S5	2	2
Evening Grosbeak	*Coccothraustes vespertinus*	Not Listed	Not Listed	Not Listed	Secure	S4B,S5N	3	1
Golden-crowned Kinglet	*Regulus satrapa*	Not Listed	Not Listed	Not Listed	Sensitive	S4	6	7
Gray Jay	*Perisoreus canadensis*	Not Listed	Not Listed	Not Listed	Sensitive	S3S4	1	1
Hairy Woodpecker	*Picoides villosus*	Not Listed	Not Listed	Not Listed	Secure	S5	1	1
Hermit Thrush	*Catharus guttatus*	Not Listed	Not Listed	Not Listed	Secure	S5B	23	32
Magnolia Warbler	*Dendroica magnolia*	Not Listed	Not Listed	Not Listed	Secure	S5B	9	11
Mourning Dove	*Zenaida macroura*	Not Listed	Not Listed	Not Listed	Secure	S5	4	4
Nashville Warbler	*Vermivora ruficapilla*	Not Listed	Not Listed	Not Listed	Secure	S5B	8	8
Northern Flicker	*Colaptes auratus*	Not Listed	Not Listed	Not Listed	Secure	S5B	7	7
Northern Parula	*Parula americana*	Not Listed	Not Listed	Not Listed	Secure	S5B	5	6
Ovenbird	*Seiurus aurocapilla*	Not Listed	Not Listed	Not Listed	Secure	S5B	16	21
Palm Warbler	*Dendroica palmarum*	Not Listed	Not Listed	Not Listed	Secure	S5B	10	15
Pine Siskin	*Spinus pinus*	Not Listed	Not Listed	Not Listed	Sensitive	S3S4B, S5N	1	1
Purple Finch	*Carpodacus purpureus*	Not Listed	Not Listed	Not Listed	Secure	S4S5	10	12
Red-eyed Vireo	*Vireo olivaceus*	Not Listed	Not Listed	Not Listed	Secure	S5B	2	2
Red-tailed Hawk	*Buteo jamaicensis*	Not Listed	Not Listed	Not at Risk	Secure	S5	1	1
Ruby-crowned Kinglet	*Regulus calendula*	Not Listed	Not Listed	Not Listed	Sensitive	S4B	8	8
Ruffed Grouse	*Bonasa umbellus*	Not Listed	Not Listed	Not Listed	Secure	S4S5	9	9
Sharp-shinned Hawk	*Accipiter striatus*	Not Listed	Not Listed	Not at Risk	Secure	S4S5B	1	1
Song Sparrow	*Melospiza melodia*	Not Listed	Not Listed	Not Listed	Secure	S5B	4	6
Swainson's Thrush	*Catharus ustulatus*	Not Listed	Not Listed	Not Listed	Secure	S4S5B	2	2
Swamp Sparrow	*Melospiza georgiana*	Not Listed	Not Listed	Not Listed	Secure	S5B	5	8
White-throated Sparrow	*Zonotrichia albicollis*	Not Listed	Not Listed	Not Listed	Secure	S5B	34	57
Winter Wren	*Troglodytes troglodytes*	Not Listed	Not Listed	Not Listed	Secure	S5B	11	11
Yellow-bellied Flycatcher	*Empidonax flaviventris*	Not Listed	Not Listed	Not Listed	Sensitive	S3S4B	1	1
Yellow-bellied Sapsucker	*Sphyrapicus varius*	Not Listed	Not Listed	Not Listed	Secure	S4S5B	2	2
Yellow-rumped Warbler	*Dendroica coronata*	Not Listed	Not Listed	Not Listed	Secure	S5B	23	26

Date	Location	Coordinates (UTM NAD83)	Habitat	Conditions				Time	Common Name	Number Observed	Distance to Observer (m)	Flyover
				Wind Speed and Direction	Temperature °C	Sky	Precipitation					
29-Apr-13	ST7	0420319; 4974288	Early successional softwood	Low	11	Cloudy	None	7:48 AM	Blue Jay	1	100+	...
...	...	...	...	...	...	...	...	...	Boreal Chickadee	2	0-50	...
...	...	...	...	...	...	...	...	...	Evening Grosbeak	1	0-50	...
...	...	...	...	...	...	...	...	...	Hermit Thrush	2	100+	...
...	...	...	...	...	...	...	...	...	Mourning Dove	1	0-50	...
...	...	...	...	...	...	...	...	...	Northern Flicker	1	100+	...
...	...	...	...	...	...	...	...	...	Palm Warbler	1	50-100	...
...	...	...	...	...	...	...	...	...	Palm Warbler	1	100+	...
...	...	...	...	...	...	...	...	...	Palm Warbler	2	0-50	...
...	...	...	...	...	...	...	...	...	Pine Siskin	1	100+	...
...	...	...	...	...	...	...	...	...	Purple Finch	1	0-50	...
...	...	...	...	...	...	...	...	...	Purple Finch	1	100+	...
...	...	...	...	...	...	...	...	...	Ruffed Grouse	1	100+	...
...	...	...	...	...	...	...	...	...	White-throated Sparrow	2	0-50	...
...	...	...	...	...	...	...	...	...	Yellow-rumped Warbler	1	0-50	...
...	ST8	0420657; 4973984	Early to mid aged softwood	Low	12	clear	None	8:04 AM	American Robin	2	50-100	...
...	...	...	...	...	...	...	...	...	Dark-eyed Junco	2	100+	...
...	...	...	...	...	...	...	...	...	Downy Woodpecker	1	100+	...
...	...	...	...	...	...	...	...	...	Golden-crowned Kinglet	1	100+	...
...	...	...	...	...	...	...	...	...	Hairy Woodpecker	1	100+	...
...	...	...	...	...	...	...	...	...	Hermit Thrush	2	100+	...
...	...	...	...	...	...	...	...	...	Northern Flicker	1	100+	...
...	...	...	...	...	...	...	...	...	Palm Warbler	1	0-50	...
...									Palm Warbler	1	50-100	...
...	...	...	...	...	...	...	...	...	Palm Warbler	1	100+	...
...	...	...	...	...	...	...	...	...	Purple Finch	1	100+	...
...	...	...	...	...	...	...	...	...	Ruby-crowned Kinglet	1	100+	...
...	...	...	...	...	...	...	...	...	Ruffed Grouse	1	100+	...
...	...	...	...	...	...	...	...	...	Winter Wren	1	100+	...
...	...	...	...	...	...	...	...	...	Yellow-bellied Sapsucker	2	100+	...
...	...	...	...	...	...	...	...	...	Yellow-rumped Warbler	1	50-100	...
...	...	...	...	...	...	...	...	...	Yellow-rumped Warbler	1	100+	...
...	ST10	0419444; 4973796	Conifer patches in cutover	Low	12	clear	None	8:43 AM	Dark-eyed Junco	1	50-100	...
...	...	...	...	...	...	...	...	...	Dark-eyed Junco	1	100+	...
...	...	...	...	...	...	...	...	...	Golden-crowned Kinglet	2	100+	...
...	...	...	...	...	...	...	...	...	Palm Warbler	2	50-100	...
...	...	...	...	...	...	...	...	...	Ruffed Grouse	1	100+	...
...	...	...	...	...	...	...	...	...	White-throated Sparrow	1	100+	...
...	...	...	...	...	...	...	...	...	Winter Wren	1	100+	...
...	...	...	...	...	...	...	...	...	Yellow-rumped Warbler	1	100+	...
...	ST12	0478685; 4974115	mature mixed wood being logged	Low	12	clear	None	9:18 AM	American Goldfinch	1	0-50	...

Date	Location	Coordinates (UTM NAD83)	Habitat	Conditions				Time	Common Name	Number Observed	Distance to Observer (m)	Flyover
				Wind Speed and Direction	Temperature °C	Sky	Precipitation					
...	...	...	...	...	...	...	...	...	American Robin	1	100+	...
...	...	...	...	...	...	...	...	...	Black-capped Chickadee	2	0-50	...
...	...	...	...	...	...	...	...	...	Downy Woodpecker	1	50-100	...
...	...	...	...	...	...	...	...	...	Hermit Thrush	2	100+	...
...	...	...	...	...	...	...	...	...	Mourning Dove	1	100+	...
...	...	...	...	...	...	...	...	...	Palm Warbler	1	50-100	...
...	...	...	...	...	...	...	...	...	Purple Finch	1	0-50	...
...	...	...	...	...	...	...	...	...	Ruby-crowned Kinglet	1	50-100	...
...	...	...	...	...	...	...	...	...	Winter Wren	1	100+	...
...	...	...	...	...	...	...	...	...	Yellow-rumped Warbler	1	50-100	...
5-May-13	ST7	0420319; 4974288	Early successional softwood	Low	13	Cloudy	None	8:10 AM	Black-and-white Warbler	1	100+	...
...	...	...	...	...	...	...	...	...	Blue Jay	1	100+	...
...	...	...	...	...	...	...	...	...	Hermit Thrush	2	100+	...
...	...	...	...	...	...	...	...	...	Magnolia Warbler	1	50-100	...
...	...	...	...	...	...	...	...	...	Nashville Warbler	1	50-100	...
...	...	...	...	...	...	...	...	...	Nashville Warbler	1	100+	...
...	...	...	...	...	...	...	...	...	Northern Flicker	1	100+	...
...	...	...	...	...	...	...	...	...	Palm Warbler	1	50-100	...
...	...	...	...	...	...	...	...	...	Palm Warbler	2	100+	...
...	...	...	...	...	...	...	...	...	Ruffed grouse	1	50-100	...
...	...	...	...	...	...	...	...	...	White-throated Sparrow	1	0-50	...
...	...	...	...	...	...	...	...	...	White-throated Sparrow	1	50-100	...
...	...	...	...	...	...	...	...	...	White-throated Sparrow	2	100+	...
...	...	...	...	...	...	...	...	...	Winter Wren	1	100+	...
...	...	...	...	...	...	...	...	...	Yellow-rumped Warbler	3	100+	...
...	ST8	0420657; 4973984	Early to mid aged softwood	Low	13	clear	None	8:25 AM	Black-and-white Warbler	2	50-100	...
...	...	...	...	...	...	...	...	...	Boreal Chickadee	1	0-50	...
...	...	...	...	...	...	...	...	...	Hermit Thrush	1	100+	...
...	...	...	...	...	...	...	...	...	Nashville Warbler	1	0-50	...
...	...	...	...	...	...	...	...	...	Palm Warbler	1	0-50	...
...	...	...	...	...	...	...	...	...	Palm Warbler	1	50-100	...
...	...	...	...	...	...	...	...	...	Palm Warbler	1	100+	...
...	...	...	...	...	...	...	...	...	Yellow-rumped Warbler	2	100+	...
...	ST10	0419444; 4973796	Conifer patches in cutover	10 km with gusts to 30, bLowing west	11	Overcast	None	7:10 AM	Blue Jay	1	0-50	...
...	...	...	...	...	...	...	...	...	Blue-headed Vireo	1	100+	...
...	...	...	...	...	...	...	...	...	Dark-eyed Junco	1	50-100	...
...	...	...	...	...	...	...	...	...	Hairy Woodpecker	1	100+	...
...	...	...	...	...	...	...	...	...	Hermit Thrush	1	100+	...
...	...	...	...	...	...	...	...	...	Northern Flicker	1	100+	...
...	...	...	...	...	...	...	...	...	Pileated Woodpecker	1	100+	...
...	...	...	...	...	...	...	...	...	Purple Finch	1	100+	...

Date	Location	Coordinates (UTM NAD83)	Habitat	Conditions				Time	Common Name	Number Observed	Distance to Observer (m)	Flyover
				Wind Speed and Direction	Temperature °C	Sky	Precipitation					
...	...	...	...	...	...	...	...	...	White-throated Sparrow	1	50-100	...
...	...	...	...	...	...	...	...	...	White-throated Sparrow	3	100+	...
...	...	...	...	...	...	...	...	...	Winter Wren	1	100+	...
...	...	...	...	...	...	...	...	...	Yellow-rumped Warbler	1	50-100	...
...	ST12	0478685; 4974115	mature mixed wood being logged	10 km with gusts to 30, bLowing west	11	Overcast	None	6:39 AM	Black-capped Chickadee	1	100+	...
...	...	...	...	...	...	...	...	...	Blue Jay	1	100+	...
...	...	...	...	...	...	...	...	...	Dark-eyed Junco	1	50-100	...
...	...	...	...	...	...	...	...	...	Hermit Thrush	2	50-100	...
...	...	...	...	...	...	...	...	...	Hermit Thrush	1	100+	...
...	...	...	...	...	...	...	...	...	Mourning Dove	1	100+	...
...	...	...	...	...	...	...	...	...	Nashville Warbler	1	50-100	...
...	...	...	...	...	...	...	...	...	Northern Flicker	1	0-50	...
...	...	...	...	...	...	...	...	...	Northern Flicker	1	50-100	...
...	...	...	...	...	...	...	...	...	Palm Warbler	2	50-100	...
...	...	...	...	...	...	...	...	...	Purple Finch	1	50-100	...
...	...	...	...	...	...	...	...	...	Red-tailed Hawk	1	0-50	...
...	...	...	...	...	...	...	...	...	White-throated Sparrow	2	100+	...
...	...	...	...	...	...	...	...	...	Yellow-rumped Warbler	1	0-50	...
...	...	...	...	...	...	...	...	...	Yellow-rumped Warbler	1	50-100	...
31-May-13	ST7	0420319; 4974288	Early successional softwood	Low	18	clear	None	6:27 AM	Bay-Breasted Warbler	1	100+	...
...	...	...	...	...	...	...	...	...	Black-and-white Warbler	1	50-100	...
...	...	...	...	...	...	...	...	...	Black-capped Chickadee	2	50-100	...
...	...	...	...	...	...	...	...	...	Black-throated Green Warbler	1	0-50	...
...	...	...	...	...	...	...	...	...	Black-throated Green Warbler	2	100+	...
...	...	...	...	...	...	...	...	...	Canada Warbler	1	100+	...
...	...	...	...	...	...	...	...	...	Hermit Thrush	1	100+	...
...	...	...	...	...	...	...	...	...	Magnolia Warbler	3	50-100	...
...	...	...	...	...	...	...	...	...	Nashville Warbler	1	0-50	...
...	...	...	...	...	...	...	...	...	Ovenbird	1	0-50	...
...	...	...	...	...	...	...	...	...	Ovenbird	1	100+	...
...	...	...	...	...	...	...	...	...	Palm Warbler	1	50-100	...
...	...	...	...	...	...	...	...	...	Palm Warbler	3	100+	...
...	...	...	...	...	...	...	...	...	White-throated Sparrow	3	100+	...
...	ST8	0420657; 4973984	Early to mid aged softwood	Low	18	clear	None	6:53 AM	Palm Warbler	1	0-50	...
...	...	...	...	...	...	...	...	...	Black-and-white Warbler	1	50-100	...
...	...	...	...	...	...	...	...	...	Blackburnian Warbler	1	50-100	...
...	...	...	...	...	...	...	...	...	Black-throated Green Warbler	1	50-100	...
...	...	...	...	...	...	...	...	...	Blue Jay	1	100+	...
...	...	...	...	...	...	...	...	...	Common Yellowthroat	1	50-100	...
...	...	...	...	...	...	...	...	...	Golden-crowned Kinglet	1	50-100	...
...	...	...	...	...	...	...	...	...	Hermit Thrush	2	100+	...

Date	Location	Coordinates (UTM NAD83)	Habitat	Conditions				Time	Common Name	Number Observed	Distance to Observer (m)	Flyover
				Wind Speed and Direction	Temperature °C	Sky	Precipitation					
...	...	...	...	...	...	...	...	...	Magnolia Warbler	1	50-100	...
...	...	...	...	...	...	...	...	...	Magnolia Warbler	2	100+	...
...	...	...	...	...	...	...	...	...	Nashville Warbler	1	0-50	...
...	...	...	...	...	...	...	...	...	Nashville Warbler	1	50-100	...
...	...	...	...	...	...	...	...	...	Northern Parula	1	100+	...
...	...	...	...	...	...	...	...	...	Ovenbird	1	50-100	...
...	...	...	...	...	...	...	...	...	Palm Warbler	1	50-100	...
...	...	...	...	...	...	...	...	...	Palm Warbler	1	100+	...
...	...	...	...	...	...	...	...	...	Purple Finch	1	100+	...
...	...	...	...	...	...	...	...	...	Red-eyed Vireo	1	100+	...
...	...	...	...	...	...	...	...	...	Swainson's Thrush	2	100+	...
...	...	...	...	...	...	...	...	...	White-throated Sparrow	1	50-100	...
...	...	...	...	...	...	...	...	...	Winter Wren	1	50-100	...
...	...	...	...	...	...	...	...	...	Yellow-bellied Flycatcher	1	100+	...
...	...	...	...	...	...	...	...	...	Yellow-rumped Warbler	3	100+	...
...	ST10	0419444; 4973796	Conifer patches in cutover	Low	21	clear	None	8:27 AM	American Goldfinch	1	0-50	...
...	...	...	...	...	...	...	...	...	American Redstart	1	100+	...
...	...	...	...	...	...	...	...	...	Blackburnian Warbler	1	100+	...
...	...	...	...	...	...	...	...	...	Black-throated Blue Warbler	1	100+	...
...	...	...	...	...	...	...	...	...	Black-throated Green Warbler	2	100+	...
...	...	...	...	...	...	...	...	...	Blue Jay	1	100+	...
...	...	...	...	...	...	...	...	...	Blue-headed Vireo	2	100+	...
...	...	...	...	...	...	...	...	...	Chestnut-sided Warbler	1	100+	...
...	...	...	...	...	...	...	...	...	Common Grackle	...	...	2 over 50m to east
...	...	...	...	...	...	...	...	...	Common Yellowthroat	2	50-100	...
...	...	...	...	...	...	...	...	...	Dark-eyed Junco	1	0-50	...
...	...	...	...	...	...	...	...	...	Dark-eyed Junco	1	100+	...
...	...	...	...	...	...	...	...	...	Hermit Thrush	1	100+	...
...	...	...	...	...	...	...	...	...	Magnolia Warbler	1	50-100	...
...	...	...	...	...	...	...	...	...	Magnolia Warbler	1	100+	...
...	...	...	...	...	...	...	...	...	Nashville Warbler	1	50-100	...
...	...	...	...	...	...	...	...	...	Nashville Warbler	1	100+	...
...	...	...	...	...	...	...	...	...	Northern Flicker	1	0-50	...
...	...	...	...	...	...	...	...	...	Northern Parula	1	50-100	...
...	...	...	...	...	...	...	...	...	Northern Parula	1	100+	...
...	...	...	...	...	...	...	...	...	Ovenbird	1	100+	...
...	...	...	...	...	...	...	...	...	Palm Warbler	1	100+	...
...	...	...	...	...	...	...	...	...	White-throated Sparrow	2	50-100	...
...	...	...	...	...	...	...	...	...	Winter Wren	1	100+	...
...	...	...	...	...	...	...	...	...	Yellow-bellied Flycatcher	1	50-100	...
...	...	...	...	...	...	...	...	...	Yellow-rumped Warbler	1	50-100	...
...	...	...	...	...	...	...	...	...	Yellow-rumped Warbler	1	100+	...

Date	Location	Coordinates (UTM NAD83)	Habitat	Conditions				Time	Common Name	Number Observed	Distance to Observer (m)	Flyover
				Wind Speed and Direction	Temperature °C	Sky	Precipitation					
...	ST12	0418685; 4974115	mature mixed wood being logged	Low	21	clear	None	7:39 AM	American Robin	1	100+	...
...	...	...	...	...	...	...	...	...	Black-throated Green Warbler	1	0-50	...
...	...	...	...	...	...	...	...	...	Black-throated Green Warbler	1	50-100	...
...	...	...	...	...	...	...	...	...	Chestnut-sided Warbler	1	50-100	...
...	...	...	...	...	...	...	...	...	Common Yellowthroat	1	50-100	...
...	...	...	...	...	...	...	...	...	Dark-eyed Junco	1	50-100	...
...	...	...	...	...	...	...	...	...	Northern Parula	1	50-100	...
...	...	...	...	...	...	...	...	...	Ovenbird	2	100+	...
...	...	...	...	...	...	...	...	...	Red-eyed Vireo	1	100+	...
...	...	...	...	...	...	...	...	...	Yellow Warbler	1	100+	...

Table G4: Control Site Spring Migration Surveys, Results Summary, Ellershouse Wind Farm *Project # 16-5807*

Common Name	Scientific Name	SARA Status	NSESA Status	COSEWIC Status	NSDNR Status	NS S-Rank	Number of Observations	Number of Individuals Observed
American Goldfinch	*Spinus tristis*	Not Listed	Not Listed	Not Listed	Secure	S5	2	2
American Redstart	*Setophaga ruticilla*	Not Listed	Not Listed	Not Listed	Secure	S5B	1	1
American Robin	*Turdus migratorius*	Not Listed	Not Listed	Not Listed	Secure	S5B	3	4
Bay-Breasted Warbler	*Dendroica castanea*	Not Listed	Not Listed	Not Listed	Sensitive	S3S4B	1	1
Black-and-white Warbler	*Mniotilta varia*	Not Listed	Not Listed	Not Listed	Secure	S4S5B	4	5
Blackburnian Warbler	*Dendroica fusca*	Not Listed	Not Listed	Not Listed	Secure	S4B	2	2
Black-capped Chickadee	*Poecile atricapillus*	Not Listed	Not Listed	Not Listed	Secure	S5	3	5
Black-throated Blue Warbler	*Dendroica caerulescens*	Not Listed	Not Listed	Not Listed	Secure	S5B	1	1
Black-throated Green Warbler	*Dendroica virens*	Not Listed	Not Listed	Not Listed	Secure	S4S5B	6	8
Blue Jay	*Cyanocitta cristata*	Not Listed	Not Listed	Not Listed	Secure	S5	6	6
Blue-headed Vireo	*Vireo solitarius*	Not Listed	Not Listed	Not Listed	Secure	S5B	2	3
Boreal Chickadee	*Poecile hudsonicus*	Not Listed	Not Listed	Not Listed	Sensitive	S3	2	3
Canada Warbler	*Wilsonia canadensis*	Threatened	Endangered	Threatened	At Risk	S3B	1	1
Chestnut-sided Warbler	*Dendroica pensylvanica*	Not Listed	Not Listed	Not Listed	Secure	S5B	2	2
Common Grackle	*Quiscalus quiscula*	Not Listed	Not Listed	Not Listed	Secure	S5B	1	0
Common Yellowthroat	*Geothlypis trichas*	Not Listed	Not Listed	Not Listed	Secure	S5B	3	4
Dark-eyed Junco	*Junco hyemalis*	Not Listed	Not Listed	Not Listed	Secure	S4S5	8	9
Downy Woodpecker	*Picoides pubescens*	Not Listed	Not Listed	Not Listed	Secure	S5	2	2
Evening Grosbeak	*Coccothraustes vespertinus*	Not Listed	Not Listed	Not Listed	Secure	S4B,S5N	1	1
Golden-crowned Kinglet	*Regulus satrapa*	Not Listed	Not Listed	Not Listed	Sensitive	S4	3	4
Hairy Woodpecker	*Picoides villosus*	Not Listed	Not Listed	Not Listed	Secure	S5	2	2
Hermit Thrush	*Catharus guttatus*	Not Listed	Not Listed	Not Listed	Secure	S5B	11	17
Magnolia Warbler	*Dendroica magnolia*	Not Listed	Not Listed	Not Listed	Secure	S5B	6	9
Mourning Dove	*Zenaida macroura*	Not Listed	Not Listed	Not Listed	Secure	S5	3	3
Nashville Warbler	*Vermivora ruficapilla*	Not Listed	Not Listed	Not Listed	Secure	S5B	9	9
Northern Flicker	*Colaptes auratus*	Not Listed	Not Listed	Not Listed	Secure	S5B	7	7
Northern Parula	*Parula americana*	Not Listed	Not Listed	Not Listed	Secure	S5B	4	4
Ovenbird	*Seiurus aurocapilla*	Not Listed	Not Listed	Not Listed	Secure	S5B	5	6
Palm Warbler	*Dendroica palmarum*	Not Listed	Not Listed	Not Listed	Secure	S5B	20	26
Pileated Woodpecker	*Dryocopus pileatus*	Not Listed	Not Listed	Not Listed	Secure	S5	1	1
Pine Siskin	*Spinus pinus*	Not Listed	Not Listed	Not Listed	Sensitive	S3S4B, S5N	1	1
Purple Finch	*Carpodacus purpureus*	Not Listed	Not Listed	Not Listed	Secure	S4S5	7	7
Red-eyed Vireo	*Vireo olivaceus*	Not Listed	Not Listed	Not Listed	Secure	S5B	2	2
Red-tailed Hawk	*Buteo jamaicensis*	Not Listed	Not Listed	Not at Risk	Secure	S5	1	1
Ruby-crowned Kinglet	*Regulus calendula*	Not Listed	Not Listed	Not Listed	Sensitive	S4B	2	2
Ruffed Grouse	*Bonasa umbellus*	Not Listed	Not Listed	Not Listed	Secure	S4S5	4	4
Swainson's Thrush	*Catharus ustulatus*	Not Listed	Not Listed	Not Listed	Secure	S4S5B	1	2
White-throated Sparrow	*Zonotrichia albicollis*	Not Listed	Not Listed	Not Listed	Secure	S5B	11	19
Winter Wren	*Troglodytes troglodytes*	Not Listed	Not Listed	Not Listed	Secure	S5B	7	7
Yellow Warbler	*Dendroica petechia*	Not Listed	Not Listed	Not Listed	Secure	S5B	1	1
Yellow-bellied Flycatcher	*Empidonax flaviventris*	Not Listed	Not Listed	Not Listed	Sensitive	S3S4B	2	2
Yellow-bellied Sapsucker	*Sphyrapicus varius*	Not Listed	Not Listed	Not Listed	Secure	S4S5B	1	2
Yellow-rumped Warbler	*Dendroica coronata*	Not Listed	Not Listed	Not Listed	Secure	S5B	13	18

Date	Location	Coordinates (UTM NAD83)	Habitat	Conditions				Time	Common Name	Number Observed	Distance to Observer (m)
				Wind	Temperature °C	Sky	Precipitation				
18-Jun-13	ST1	0418951; 4975948	Mid aged mixed wood near clearcut	10 to 25 to the southwest	9	Overcast	None	4:53 AM	American Robin	3	50-100
...	...	...	...	...	...	...	...	...	Alder Flycatcher	3	100+
...	...	...	...	...	...	...	...	...	American Redstart	2	50-100
...	...	...	...	...	...	...	...	...	American Woodcock	4	50-100
...	...	...	...	...	...	...	...	...	Black-and-white Warbler	1	100+
...	...	...	...	...	...	...	...	...	Black-capped Chickadee	1	100+
...	...	...	...	...	...	...	...	...	Common Yellowthroat	1	50-100
...	...	...	...	...	...	...	...	...	Common Yellowthroat	1	100+
...	...	...	...	...	...	...	...	...	Hermit Thrush	1	100+
...	...	...	...	...	...	...	...	...	Least Flycatcher	1	0-50
...	...	...	...	...	...	...	...	...	Northern Parula	1	50-100
...	...	...	...	...	...	...	...	...	Ovenbird	2	100+
...	...	...	...	...	...	...	...	...	Purple Finch	1	100+
...	...	...	...	...	...	...	...	...	Red-eyed Vireo	1	50-100
...	...	...	...	...	...	...	...	...	White-throated Sparrow	2	100+
...	ST2	0419968; 4975681	Early to mid aged mixed wood	10 to 25 to the southwest	9	Overcast	None	5:07 AM	American Robin	1	100+
...	...	...	...	...	...	...	...	...	Black-throated Green Warbler	2	50-100
...	...	...	...	...	...	...	...	...	Dark-eyed Junco	1	50-100
...	...	...	...	...	...	...	...	...	Golden-crowned Kinglet	1	50-100
...	...	...	...	...	...	...	...	...	Northern Parula	1	50-100
...	...	...	...	...	...	...	...	...	Ovenbird	1	50-100
...	ST3	0420675; 4975670	Mid-aged to mature mixed wood	10km south	17	Clear	None	8:26 AM	Black-and-white Warbler	1	50-100
...	...	...	...	...	...	...	...	...	Black-capped Chickadee	1	0-50
...	...	...	...	...	...	...	...	...	Black-throated Green Warbler	1	0-50
...	...	...	...	...	...	...	...	...	Blue Jay	1	100+
...	...	...	...	...	...	...	...	...	Cedar Waxwing	1	50-100
...	...	...	...	...	...	...	...	...	Chestnut-sided Warbler	1	50-100
...	...	...	...	...	...	...	...	...	Chestnut-sided Warbler	1	100+
...	...	...	...	...	...	...	...	...	Golden-crowned Kinglet	1	0-50
...	...	...	...	...	...	...	...	...	Magnolia Warbler	1	50-100
...	...	...	...	...	...	...	...	...	Northern Parula	1	0-50
...	...	...	...	...	...	...	...	...	Ovenbird	1	50-100
...	...	...	...	...	...	...	...	...	Red-eyed Vireo	1	0-50
...	...	...	...	...	...	...	...	...	Red-eyed Vireo	1	50-100
...	...	...	...	...	...	...	...	...	Swainson's Thrush	1	50-100
...	...	...	...	...	...	...	...	...	White-throated Sparrow	1	100+
...	...	...	...	...	...	...	...	...	Yellow-throated Warbler	1	0-50
...	ST4	0419782; 4975021	Mature hardwood	10 to 25 to the southwest	9	Overcast	None	5:19 AM	Alder Flycatcher	1	100+
...	...	...	...	...	...	...	...	...	American Redstart	1	50-100
...	...	...	...	...	...	...	...	...	American Robin	1	50-100
...	...	...	...	...	...	...	...	...	Black-and-white Warbler	1	0-50
...	...	...	...	...	...	...	...	...	Black-and-white Warbler	1	50-100
...	...	...	...	...	...	...	...	...	Black-throated Green Warbler	1	100+
...	...	...	...	...	...	...	...	...	Chestnut-sided Warbler	1	0-50
...	...	...	...	...	...	...	...	...	Common Yellowthroat	1	100+
...	...	...	...	...	...	...	...	...	Dark-eyed Junco	1	100+
...	...	...	...	...	...	...	...	...	Hermit Thrush	2	50-100

Date	Location	Coordinates (UTM NAD83)	Habitat	Conditions				Time	Common Name	Number Observed	Distance to Observer (m)
				Wind	Temperature °C	Sky	Precipitation				
...	...	...	...	...	...	...	...	...	Hermit Thrush	1	100+
...	...	...	...	...	...	...	...	...	Magnolia Warbler	1	50-100
...	...	...	...	...	...	...	...	...	Magnolia Warbler	1	100+
...	...	...	...	...	...	...	...	...	Ovenbird	1	100+
...	...	...	...	...	...	...	...	...	Red-eyed Vireo	1	0-50
...	...	...	...	...	...	...	...	...	Red-eyed Vireo	1	100+
...	...	...	...	...	...	...	...	...	Swainson's Thrush	1	100+
...	...	...	...	...	...	...	...	...	White-throated Sparrow	1	50-100
...	...	...	...	...	...	...	...	...	Winter Wren	1	100+
...	ST5	0420311; 4975001	Early successional mixed wood near watercourse	10 to 25 to the southwest	9	Overcast	None	5:37 AM	American Robin	1	0-50
...	...	...	...	...	...	...	...	...	American Robin	1	100+
...	...	...	...	...	...	...	...	...	American Woodcock	1	50-100
...	...	...	...	...	...	...	...	...	Black-and-white Warbler	1	50-100
...	...	...	...	...	...	...	...	...	Black-throated Green Warbler	1	50-100
...	...	...	...	...	...	...	...	...	Blue-headed Vireo	1	50-100
...	...	...	...	...	...	...	...	...	Blue-headed Vireo	1	100+
...	...	...	...	...	...	...	...	...	Common Yellowthroat	1	50-100
...	...	...	...	...	...	...	...	...	Hermit Thrush	2	100+
...	...	...	...	...	...	...	...	...	Magnolia Warbler	1	50-100
...	...	...	...	...	...	...	...	...	Northern Parula	2	100+
...	...	...	...	...	...	...	...	...	Ovenbird	1	50-100
...	...	...	...	...	...	...	...	...	Ovenbird	1	100+
...	ST6	0420568; 4975187	swamp surrounded by mature mixed wood forrest	10 to 25 to the southwest	9	Overcast	None	5:51 AM	Alder Flycatcher	1	100+
...	...	...	...	...	...	...	...	...	Black-and-white Warbler	1	100+
...	...	...	...	...	...	...	...	...	Black-throated Blue Warbler	1	100+
...	...	...	...	...	...	...	...	...	Blue Jay	1	100+
...	...	...	...	...	...	...	...	...	Blue-headed Vireo	1	100+
...	...	...	...	...	...	...	...	...	Chestnut-sided Warbler	1	100+
...	...	...	...	...	...	...	...	...	Common Yellowthroat	1	100+
...	...	...	...	...	...	...	...	...	Dark-eyed Junco	1	0-50
...	...	...	...	...	...	...	...	...	Magnolia Warbler	1	100+
...	...	...	...	...	...	...	...	...	Ovenbird	1	50-100
...	...	...	...	...	...	...	...	...	Red-eyed Vireo	2	100+
...	...	...	...	...	...	...	...	...	Winter Wren	1	100+
...	...	...	...	...	...	...	...	...	Yellow-bellied Flycatcher	1	100+
...	ST9	0419425; 4974246	Mid to mature aged mixed wood in valley near cutover	10km south	17	Clear	None	7:02 AM	Black-and-white Warbler	1	0-50
...	...	...	...	...	...	...	...	...	Black-and-white Warbler	1	50-100
...	...	...	...	...	...	...	...	...	Black-capped Chickadee	1	100+
...	...	...	...	...	...	...	...	...	Black-throated Green Warbler	1	0-50
...	...	...	...	...	...	...	...	...	Black-throated Green Warbler	1	50-100
...	...	...	...	...	...	...	...	...	Hairy Woodpecker	1	100+
...	...	...	...	...	...	...	...	...	Hermit Thrush	1	100+
...	...	...	...	...	...	...	...	...	Magnolia Warbler	1	0-50

Date	Location	Coordinates (UTM NAD83)	Habitat	Conditions				Time	Common Name	Number Observed	Distance to Observer (m)
				Wind	Temperature °C	Sky	Precipitation				
...	...	...	...	...	...	...	...	...	Magnolia Warbler	1	50-100
...	...	...	...	...	...	...	...	...	Northern Flicker	1	100+
...	...	...	...	...	...	...	...	...	Northern Parula	1	50-100
...	...	...	...	...	...	...	...	...	Ovenbird	1	0-50
...	...	...	...	...	...	...	...	...	Palm Warbler	1	50-100
...	...	...	...	...	...	...	...	...	Red-breasted Nuthatch	1	100+
...	...	...	...	...	...	...	...	...	Red-eyed Vireo	1	50-100
...	...	...	...	...	...	...	...	...	Red-eyed Vireo	1	100+
...	...	...	...	...	...	...	...	...	Ruby-crowned Kinglet	1	50-100
...	...	...	...	...	...	...	...	...	Ruby-throated Hummingbird	1	0-50
...	...	...	...	...	...	...	...	...	Ruffed Grouse	3	0-50
...	...	...	...	...	...	...	...	...	White-throated Sparrow	2	100+
...	ST11	0418829; 4974567	Early to mid aged mixed wood	10km south	17	Clear	None	7:41 AM	American Redstart	1	50-100
...	...	...	...	...	...	...	...	...	Black-and-white Warbler	1	0-50
...	...	...	...	...	...	...	...	...	Black-throated Blue Warbler	1	0-50
...	...	...	...	...	...	...	...	...	Magnolia Warbler	1	50-100
...	...	...	...	...	...	...	...	...	Red-breasted Nuthatch	1	50-100
...	...	...	...	...	...	...	...	...	Red-eyed Vireo	1	0-50
...	...	...	...	...	...	...	...	...	Winter Wren	1	100+
25-Jun-13	ST1	0418951; 4975948	Mid aged mixed wood near clearcut	Low	19	Variable Cloudiness	None	5:28 AM	Alder Flycatcher	1	100+
...	...	...	...	...	...	...	...	...	American Robin	1	0-50
...	...	...	...	...	...	...	...	...	American Robin	1	100+
...	...	...	...	...	...	...	...	...	Chestnut-sided Warbler	1	50-100
...	...	...	...	...	...	...	...	...	Chestnut-sided Warbler	1	100+
...	...	...	...	...	...	...	...	...	Dark-eyed Junco	1	50-100
...	...	...	...	...	...	...	...	...	Hermit Thrush	1	100+
...	...	...	...	...	...	...	...	...	Least Flycatcher	1	0-50
...	...	...	...	...	...	...	...	...	Least Flycatcher	1	50-100
...	...	...	...	...	...	...	...	...	Mourning Dove	1	100+
...	...	...	...	...	...	...	...	...	Northern Parula	1	50-100
...	...	...	...	...	...	...	...	...	Ovenbird	1	50-100
...	...	...	...	...	...	...	...	...	Ovenbird	1	100+
...	...	...	...	...	...	...	...	...	Red-eyed Vireo	1	50-100
...	...	...	...	...	...	...	...	...	Red-eyed Vireo	1	100+
...	...	...	...	...	...	...	...	...	White-throated Sparrow	1	100+
...	ST2	0419968; 4975681	Early to mid aged mixed wood	Low	19	Variable Cloudiness	None	5:44 AM	Black-and-white Warbler	1	0-50
...	...	...	...	...	...	...	...	...	Black-throated Blue Warbler	1	100+
...	...	...	...	...	...	...	...	...	Black-throated Green Warbler	2	100+
...	...	...	...	...	...	...	...	...	Dark-eyed Junco	1	50-100
...	...	...	...	...	...	...	...	...	Hermit Thrush	1	100+
...	...	...	...	...	...	...	...	...	Magnolia Warbler	1	50-100
...	...	...	...	...	...	...	...	...	Ovenbird	1	50-100
...	...	...	...	...	...	...	...	...	Ovenbird	3	100+
...	...	...	...	...	...	...	...	...	Red-eyed Vireo	2	100+
...	...	...	...	...	...	...	...	...	Swainson's Thrush	1	100+
...	...	...	...	...	...	...	...	...	Winter Wren	1	100+
...	...	...	...	...	...	...	...	...	Yellow-rumped Warbler	1	100+

Date	Location	Coordinates (UTM NAD83)	Habitat	Conditions				Time	Common Name	Number Observed	Distance to Observer (m)
				Wind	Temperature °C	Sky	Precipitation				
...	ST3	0420675; 4975670	Mid-aged to mature mixed wood	10km west	24	Clear	None	9:10 AM	American Redstart	1	50-100
...	...	...	...	...	...	...	...	...	Black-and-white Warbler	1	0-50
...	...	...	...	...	...	...	...	...	Black-throated Green Warbler	1	0-50
...	...	...	...	...	...	...	...	...	Black-throated Green Warbler	1	50-100
...	...	...	...	...	...	...	...	...	Chestnut-sided Warbler	1	50-100
...	...	...	...	...	...	...	...	...	Common Yellowthroat	1	50-100
...	...	...	...	...	...	...	...	...	Hermit Thrush	1	100+
...	...	...	...	...	...	...	...	...	Magnolia Warbler	1	50-100
...	...	...	...	...	...	...	...	...	Northern Parula	1	0-50
...	...	...	...	...	...	...	...	...	Ovenbird	1	50-100
...	...	...	...	...	...	...	...	...	Ovenbird	1	100+
...	...	...	...	...	...	...	...	...	Red-eyed Vireo	1	50-100
...	...	...	...	...	...	...	...	...	White-throated Sparrow	2	0-50
...	...	...	...	...	...	...	...	...	White-throated Sparrow	1	100+
...	ST4	0419782; 4975021	Mature hardwood	Low	19	Variable Cloudiness	None	5:56 AM	Alder Flycatcher	1	100+
...	...	...	...	...	...	...	...	...	American Robin	1	50-100
...	...	...	...	...	...	...	...	...	Black-and-white Warbler	1	0-50
...	...	...	...	...	...	...	...	...	Black-and-white Warbler	1	50-100
...	...	...	...	...	...	...	...	...	Black-and-white Warbler	1	100+
...	...	...	...	...	...	...	...	...	Black-capped Chickadee	1	0-50
...	...	...	...	...	...	...	...	...	Black-throated Blue Warbler	1	100+
...	...	...	...	...	...	...	...	...	Black-throated Green Warbler	1	0-50
...	...	...	...	...	...	...	...	...	Chestnut-sided Warbler	1	50-100
...	...	...	...	...	...	...	...	...	Chestnut-sided Warbler	1	100+
...	...	...	...	...	...	...	...	...	Hermit Thrush	1	100+
...	...	...	...	...	...	...	...	...	Magnolia Warbler	1	0-50
...	...	...	...	...	...	...	...	...	Magnolia Warbler	2	50-100
...	...	...	...	...	...	...	...	...	Nashville Warbler	1	100+
...	...	...	...	...	...	...	...	...	Ovenbird	1	0-50
...	...	...	...	...	...	...	...	...	Red-breasted Nuthatch	1	50-100
...	...	...	...	...	...	...	...	...	Red-eyed Vireo	2	100+
...	...	...	...	...	...	...	...	...	Swainson's Thrush	1	50-100
...	...	...	...	...	...	...	...	...	White-throated Sparrow	2	100+
...	...	...	...	...	...	...	...	...	Winter Wren	1	50-100
...	...	...	...	...	...	...	...	...	Yellow-bellied Flycatcher	1	100+
...	ST5	0420311; 4975001	Early successional mixed wood near watercourse	Low	19	Variable Cloudiness	None	5:56 AM	American Goldfinch	1	50-100
...	...	...	...	...	...	...	...	...	Black-and-white Warbler	2	50-100
...	...	...	...	...	...	...	...	...	Black-and-white Warbler	1	100+
...	...	...	...	...	...	...	...	...	Black-throated Green Warbler	1	50-100
...	...	...	...	...	...	...	...	...	Black-throated Green Warbler	1	100+
...	...	...	...	...	...	...	...	...	Blue-headed Vireo	2	50-100
...	...	...	...	...	...	...	...	...	Canada Warbler	1	50-100
...	...	...	...	...	...	...	...	...	Cedar Waxwing	2	50-100
...	...	...	...	...	...	...	...	...	Common Yellowthroat	1	50-100
...	...	...	...	...	...	...	...	...	Nashville Warbler	1	100+
...	...	...	...	...	...	...	...	...	Ovenbird	2	100+
...	...	...	...	...	...	...	...	...	White-throated Sparrow	1	100+

Date	Location	Coordinates (UTM NAD83)	Habitat	Conditions				Time	Common Name	Number Observed	Distance to Observer (m)
				Wind	Temperature °C	Sky	Precipitation				
...	...	...	...	...	...	...	...	...	Yellow-rumped Warbler	1	100+
...	ST6	0420568; 4975187	swamp surrounded by mature mixed wood forrest	Low	19	Variable Cloudiness	None	6:29 AM	American Robin	1	0-50
...	...	...	...	...	...	...	...	...	Black-throated Blue Warbler	1	100+
...	...	...	...	...	...	...	...	...	Black-throated Green Warbler	1	0-50
...	...	...	...	...	...	...	...	...	Blue Jay	1	50-100
...	...	...	...	...	...	...	...	...	Blue-headed Vireo	1	100+
...	...	...	...	...	...	...	...	...	Chestnut-sided Warbler	1	50-100
...	...	...	...	...	...	...	...	...	Common Yellowthroat	1	100+
...	...	...	...	...	...	...	...	...	Hermit Thrush	1	100+
...	...	...	...	...	...	...	...	...	Nashville Warbler	1	100+
...	...	...	...	...	...	...	...	...	Northern Flicker	1	50-100
...	...	...	...	...	...	...	...	...	Northern Parula	1	50-100
...	...	...	...	...	...	...	...	...	Ovenbird	1	50-100
...	...	...	...	...	...	...	...	...	Purple Finch	1	100+
...	...	...	...	...	...	...	...	...	Red-eyed Vireo	2	100+
...	...	...	...	...	...	...	...	...	Winter Wren	1	50-100
...	...	...	...	...	...	...	...	...	Yellow-bellied Sapsucker	1	50-100
...	ST9	0419425; 4974246	Mid to mature aged mixed wood in valley near cutover	Low	20	Variable Cloudiness	None	7:53 AM	American Robin	1	100+
...	...	...	...	...	...	...	...	...	Black-and-white Warbler	1	0-50
...	...	...	...	...	...	...	...	...	Black-throated Green Warbler	1	0-50
...	...	...	...	...	...	...	...	...	Black-throated Green Warbler	1	50-100
...	...	...	...	...	...	...	...	...	Black-throated Green Warbler	1	100+
...	...	...	...	...	...	...	...	...	Common Yellowthroat	1	50-100
...	...	...	...	...	...	...	...	...	Dark-eyed Junco	1	50-100
...	...	...	...	...	...	...	...	...	Hermit Thrush	1	50-100
...	...	...	...	...	...	...	...	...	Hermit Thrush	1	100+
...	...	...	...	...	...	...	...	...	Magnolia Warbler	1	50-100
...	...	...	...	...	...	...	...	...	Mourning Dove	2	100+
...	...	...	...	...	...	...	...	...	Northern Parula	1	0-50
...	...	...	...	...	...	...	...	...	Northern Parula	1	50-100
...	...	...	...	...	...	...	...	...	Ovenbird	1	50-100
...	...	...	...	...	...	...	...	...	Palm Warbler	1	50-100
...	...	...	...	...	...	...	...	...	Pileated Woodpecker	1	100+
...	...	...	...	...	...	...	...	...	White-throated Sparrow	2	100+
...	ST11	0418829; 4974567	Early to mid aged mixed wood	Low	22	Clear	None	8:26 AM	American Redstart	1	50-100
...	...	...	...	...	...	...	...	...	American Woodcock	1	0-50
...	...	...	...	...	...	...	...	...	Black-and-white Warbler	1	0-50
...	...	...	...	...	...	...	...	...	Black-and-white Warbler	1	50-100
...	...	...	...	...	...	...	...	...	Black-throated Blue Warbler	1	50-100
...	...	...	...	...	...	...	...	...	Black-throated Green Warbler	1	100+
...	...	...	...	...	...	...	...	...	Blue Jay	2	50-100
...	...	...	...	...	...	...	...	...	Chestnut-sided Warbler	1	0-50
...	...	...	...	...	...	...	...	...	Magnolia Warbler	2	50-100
...	...	...	...	...	...	...	...	...	Northern Flicker	1	100+
...	...	...	...	...	...	...	...	...	Northern Parula	1	0-50
...	...	...	...	...	...	...	...	...	Ovenbird	1	100+

Date	Location	Coordinates (UTM NAD83)	Habitat	Conditions				Time	Common Name	Number Observed	Distance to Observer (m)
				Wind	Temperature °C	Sky	Precipitation				
...	...	...	...	...	...	...	...	...	Pine Siskin	1	**FO**
...	...	...	...	...	...	...	...	...	Red-breasted Nuthatch	1	50-100
...	...	...	...	...	...	...	...	...	Red-eyed Vireo	1	100+
...	...	...	...	...	...	...	...	...	White-throated Sparrow	1	50-100
...	...	...	...	...	...	...	...	...	White-throated Sparrow	2	100+

Table G6: Project Site Breeding Bird Surveys, Results Summary, Ellershouse Wind Farm *Project # 16-5807*

Common Name	Scientific Name	SARA Status	NSESA Status	COSEWIC Status	NSDNR Status	NS S-Rank	Number of Observations	Total Individuals Observed
Alder Flycatcher	*Empidonax alnorum*	Not Listed	Not Listed	Not Listed	Secure	S5B	5	7
American Goldfinch	*Spinus tristis*	Not Listed	Not Listed	Not Listed	Secure	S5	1	1
American Redstart	*Setophaga ruticilla*	Not Listed	Not Listed	Not Listed	Secure	S5B	5	6
American Robin	*Turdus migratorius*	Not Listed	Not Listed	Not Listed	Secure	S5B	10	12
American Woodcock	*Scolopax minor*	Not Listed	Not Listed	Not Listed	Secure	S4S5B	3	6
Black-and-white Warbler	*Mniotilta varia*	Not Listed	Not Listed	Not Listed	Secure	S4S5B	19	20
Black-capped Chickadee	*Poecile atricapillus*	Not Listed	Not Listed	Not Listed	Secure	S5	4	4
Black-throated Blue Warbler	*Dendroica caerulescens*	Not Listed	Not Listed	Not Listed	Secure	S5B	6	6
Black-throated Green Warbler	*Dendroica virens*	Not Listed	Not Listed	Not Listed	Secure	S4S5B	17	19
Blue Jay	*Cyanocitta cristata*	Not Listed	Not Listed	Not Listed	Secure	S5	4	5
Blue-headed Vireo	*Vireo solitarius*	Not Listed	Not Listed	Not Listed	Secure	S5B	5	6
Canada Warbler	*Wilsonia canadensis*	Threatened	Endangered	Threatened	At Risk	S3B	1	1
Cedar Waxwing	*Bombycilla cedrorum*	Not Listed	Not Listed	Not Listed	Secure	S5B	2	3
Chestnut-sided Warbler	*Dendroica pensylvanica*	Not Listed	Not Listed	Not Listed	Secure	S5B	11	11
Common Yellowthroat	*Geothlypis trichas*	Not Listed	Not Listed	Not Listed	Secure	S5B	9	9
Dark-eyed Junco	*Junco hyemalis*	Not Listed	Not Listed	Not Listed	Secure	S4S5	6	6
Golden-crowned Kinglet	*Regulus satrapa*	Not Listed	Not Listed	Not Listed	Sensitive	S4	2	2
Hairy Woodpecker	*Picoides villosus*	Not Listed	Not Listed	Not Listed	Secure	S5	1	1
Hermit Thrush	*Catharus guttatus*	Not Listed	Not Listed	Not Listed	Secure	S5B	12	14
Least Flycatcher	*Empidonax minimus*	Not Listed	Not Listed	Not Listed	Secure	S4B	3	3
Magnolia Warbler	*Dendroica magnolia*	Not Listed	Not Listed	Not Listed	Secure	S5B	14	16
Mourning Dove	*Zenaida macroura*	Not Listed	Not Listed	Not Listed	Secure	S5	2	3
Nashville Warbler	*Vermivora ruficapilla*	Not Listed	Not Listed	Not Listed	Secure	S5B	3	3
Northern Flicker	*Colaptes auratus*	Not Listed	Not Listed	Not Listed	Secure	S5B	3	3
Northern Parula	*Parula americana*	Not Listed	Not Listed	Not Listed	Secure	S5B	11	12
Ovenbird	*Seiurus aurocapilla*	Not Listed	Not Listed	Not Listed	Secure	S5B	19	23
Palm Warbler	*Dendroica palmarum*	Not Listed	Not Listed	Not Listed	Secure	S5B	2	2
Pileated Woodpecker	*Dryocopus pileatus*	Not Listed	Not Listed	Not Listed	Secure	S5	1	1
Pine Siskin	*Spinus pinus*	Not Listed	Not Listed	Not Listed	Sensitive	S3S4B, S5N	1	1
Purple Finch	*Carpodacus purpureus*	Not Listed	Not Listed	Not Listed	Secure	S4S5	2	2
Red-breasted Nuthatch	*Sitta canadensis*	Not Listed	Not Listed	Not Listed	Secure	S4S5	4	4
Red-eyed Vireo	*Vireo olivaceus*	Not Listed	Not Listed	Not Listed	Secure	S5B	16	20
Ruby-crowned Kinglet	*Regulus calendula*	Not Listed	Not Listed	Not Listed	Sensitive	S4B	1	1
Ruby-throated Hummingbird	*Archilochus colubris*	Not Listed	Not Listed	Not Listed	Secure	S5B	1	1
Ruffed Grouse	*Bonasa umbellus*	Not Listed	Not Listed	Not Listed	Secure	S4S5	1	3
Swainson's Thrush	*Catharus ustulatus*	Not Listed	Not Listed	Not Listed	Secure	S4S5B	4	4
White-throated Sparrow	*Zonotrichia albicollis*	Not Listed	Not Listed	Not Listed	Secure	S5B	12	18
Winter Wren	*Troglodytes troglodytes*	Not Listed	Not Listed	Not Listed	Secure	S5B	6	6
Yellow-bellied Flycatcher	*Empidonax flaviventris*	Not Listed	Not Listed	Not Listed	Sensitive	S3S4B	2	2
Yellow-bellied Sapsucker	*Sphyrapicus varius*	Not Listed	Not Listed	Not Listed	Secure	S4S5B	1	1
Yellow-rumped Warbler	*Dendroica coronata*	Not Listed	Not Listed	Not Listed	Secure	S5B	2	2
Yellow-throated Warbler	*Dendroica dominica*	Not Listed	Not Listed	Not Listed	Accidental	SNA	1	1

Probable Breeder
Confirmed Breeder

Common Name	Scientific Name	SARA Status	NSESA Status	COSEWIC Status	NSDNR Status	NS S-Rank	Number of Observations	Number of Individuals Observed
Alder Flycatcher	*Empidonax alnorum*	Not Listed	Not Listed	Not Listed	Secure	S5B	3	5
American Redstart	*Setophaga ruticilla*	Not Listed	Not Listed	Not Listed	Secure	S5B	1	1
American Robin	*Turdus migratorius*	Not Listed	Not Listed	Not Listed	Secure	S5B	5	7
Black-and-white Warbler	*Mniotilta varia*	Not Listed	Not Listed	Not Listed	Secure	S4S5B	9	9
Black-backed Woodpecker	*Picoides arcticus*	Not Listed	Not Listed	Not Listed	Sensitive	S3S4	1	1
Blackburnian Warbler	*Dendroica fusca*	Not Listed	Not Listed	Not Listed	Secure	S4B	1	1
Black-capped Chickadee	*Poecile atricapillus*	Not Listed	Not Listed	Not Listed	Secure	S5	3	3
Black-throated Blue Warbler	*Dendroica caerulescens*	Not Listed	Not Listed	Not Listed	Secure	S5B	1	1
Black-throated Green Warbler	*Dendroica virens*	Not Listed	Not Listed	Not Listed	Secure	S4S5B	12	18
Blue Jay	*Cyanocitta cristata*	Not Listed	Not Listed	Not Listed	Secure	S5	4	4
Blue-headed Vireo	*Vireo solitarius*	Not Listed	Not Listed	Not Listed	Secure	S5B	7	7
Cedar Waxwing	*Bombycilla cedrorum*	Not Listed	Not Listed	Not Listed	Secure	S5B	3	6
Chestnut-sided Warbler	*Dendroica pensylvanica*	Not Listed	Not Listed	Not Listed	Secure	S5B	3	3
Common Raven	*Corvus corax*	Not Listed	Not Listed	Not Listed	Secure	S5	2	2
Common Yellowthroat	*Geothlypis trichas*	Not Listed	Not Listed	Not Listed	Secure	S5B	7	7
Dark-eyed Junco	*Junco hyemalis*	Not Listed	Not Listed	Not Listed	Secure	S4S5	7	7
Eastern Wood-pewee	*Contopus virens*	No Status	Vulnerable	Special Concern	Sensitive	S3S4B	1	1
Golden-crowned Kinglet	*Regulus satrapa*	Not Listed	Not Listed	Not Listed	Sensitive	S4	4	4
Gray Jay	*Perisoreus canadensis*	Not Listed	Not Listed	Not Listed	Sensitive	S3S4	2	3
Hairy Woodpecker	*Picoides villosus*	Not Listed	Not Listed	Not Listed	Secure	S5	3	3
Hermit Thrush	*Catharus guttatus*	Not Listed	Not Listed	Not Listed	Secure	S5B	8	12
Magnolia Warbler	*Dendroica magnolia*	Not Listed	Not Listed	Not Listed	Secure	S5B	12	14
Mourning Dove	*Zenaida macroura*	Not Listed	Not Listed	Not Listed	Secure	S5	4	4
Mourning Warbler	*Oporornis philadelphia*	Not Listed	Not Listed	Not Listed	Secure	S4B	1	1
Nashville Warbler	*Vermivora ruficapilla*	Not Listed	Not Listed	Not Listed	Secure	S5B	6	6
Northern Flicker	*Colaptes auratus*	Not Listed	Not Listed	Not Listed	Secure	S5B	1	1
Northern Parula	*Parula americana*	Not Listed	Not Listed	Not Listed	Secure	S5B	2	2
Olive-sided Flycatcher	*Contopus cooperi*	Threatened	Threatened	Threatened	At Risk	S3B	2	2
Ovenbird	*Seiurus aurocapilla*	Not Listed	Not Listed	Not Listed	Secure	S5B	14	14
Palm Warbler	*Dendroica palmarum*	Not Listed	Not Listed	Not Listed	Secure	S5B	10	11
Pileated Woodpecker	*Dryocopus pileatus*	Not Listed	Not Listed	Not Listed	Secure	S5	3	3
Purple Finch	*Carpodacus purpureus*	Not Listed	Not Listed	Not Listed	Secure	S4S5	3	3
Red-breasted Nuthatch	*Sitta canadensis*	Not Listed	Not Listed	Not Listed	Secure	S4S5	1	1
Red-eyed Vireo	*Vireo olivaceus*	Not Listed	Not Listed	Not Listed	Secure	S5B	8	8
Swainson's Thrush	*Catharus ustulatus*	Not Listed	Not Listed	Not Listed	Secure	S4S5B	3	3
White-throated Sparrow	*Zonotrichia albicollis*	Not Listed	Not Listed	Not Listed	Secure	S5B	10	19
Winter Wren	*Troglodytes troglodytes*	Not Listed	Not Listed	Not Listed	Secure	S5B	7	7
Yellow-bellied Flycatcher	*Empidonax flaviventris*	Not Listed	Not Listed	Not Listed	Sensitive	S3S4B	1	1
Yellow-rumped Warbler	*Dendroica coronata*	Not Listed	Not Listed	Not Listed	Secure	S5B	8	8

Probable Breeder
Confirmed Breeder

Common Name	Scientific Name	SARA Status	NSESA Status	COSEWIC Status	NSDNR Status	NS S-Rank	Number of Times Observed	Number of Individuals Observed
American Crow	*Corvus brachyrhynchos*	Not Listed	Not Listed	Not Listed	Secure	S5	1	6
American Goldfinch	*Spinus tristis*	Not Listed	Not Listed	Not Listed	Secure	S5	8	16
American Redstart	*Setophaga ruticilla*	Not Listed	Not Listed	Not Listed	Secure	S5B	1	1
American Robin	*Turdus migratorius*	Not Listed	Not Listed	Not Listed	Secure	S5B	6	8
American Woodcock	*Scolopax minor*	Not Listed	Not Listed	Not Listed	Secure	S4S5B	1	1
Bay-breasted Warbler	*Dendroica castanea*	Not Listed	Not Listed	Not Listed	Sensitive	S3S4B	1	1
Black-and-white Warbler	*Mniotilta varia*	Not Listed	Not Listed	Not Listed	Secure	S4S5B	7	8
Black-capped Chickadee	*Poecile atricapillus*	Not Listed	Not Listed	Not Listed	Secure	S5	32	103
Black-throated Blue Warbler	*Dendroica caerulescens*	Not Listed	Not Listed	Not Listed	Secure	S5B	1	1
Black-throated Green Warbler	*Dendroica virens*	Not Listed	Not Listed	Not Listed	Secure	S4S5B	12	20
Blue Jay	*Cyanocitta cristata*	Not Listed	Not Listed	Not Listed	Secure	S5	22	33
Blue-headed Vireo	*Vireo solitarius*	Not Listed	Not Listed	Not Listed	Secure	S5B	5	8
Boreal Chickadee	*Poecile hudsonicus*	Not Listed	Not Listed	Not Listed	Sensitive	S3	1	5
Broad-winged Hawk	*Buteo platypterus*	Not Listed	Not Listed	Not Listed	Secure	S4S5B	2	2
Brown Creeper	*Certhia americana*	Not Listed	Not Listed	Not Listed	Secure	S5	1	1
Canada Goose	*Branta canadensis*	Not Listed	Not Listed	Not Listed	Secure	SNAB,S4N	1	1
Cedar Waxwing	*Bombycilla cedrorum*	Not Listed	Not Listed	Not Listed	Secure	S5B	1	2
Chestnut-sided Warbler	*Dendroica pensylvanica*	Not Listed	Not Listed	Not Listed	Secure	S5B	1	1
Common Raven	*Corvus corax*	Not Listed	Not Listed	Not Listed	Secure	S5	13	18
Common Yellowthroat	*Geothlypis trichas*	Not Listed	Not Listed	Not Listed	Secure	S5B	5	7
Dark-eyed Junco	*Junco hyemalis*	Not Listed	Not Listed	Not Listed	Secure	S4S5	10	14
Downy Woodpecker	*Picoides pubescens*	Not Listed	Not Listed	Not Listed	Secure	S5	4	4
Eastern Wood-pewee	*Contopus virens*	No Status	Vulnerable	Special Concern	Sensitive	S3S4B	1	1
Golden-crowned Kinglet	*Regulus satrapa*	Not Listed	Not Listed	Not Listed	Sensitive	S4	26	63
Hairy Woodpecker	*Picoides villosus*	Not Listed	Not Listed	Not Listed	Secure	S5	5	6
Hermit Thrush	*Catharus guttatus*	Not Listed	Not Listed	Not Listed	Secure	S5B	6	6
Least Flycatcher	*Empidonax minimus*	Not Listed	Not Listed	Not Listed	Secure	S4B	1	1
Magnolia Warbler	*Dendroica magnolia*	Not Listed	Not Listed	Not Listed	Secure	S5B	7	10
Nashville Warbler	*Vermivora ruficapilla*	Not Listed	Not Listed	Not Listed	Secure	S5B	3	3
Northern Flicker	*Colaptes auratus*	Not Listed	Not Listed	Not Listed	Secure	S5B	3	3
Northern Parula	*Parula americana*	Not Listed	Not Listed	Not Listed	Secure	S5B	9	12
Ovenbird	*Seiurus aurocapilla*	Not Listed	Not Listed	Not Listed	Secure	S5B	1	1
Palm Warbler	*Dendroica palmarum*	Not Listed	Not Listed	Not Listed	Secure	S5B	4	6
Pileated Woodpecker	*Dryocopus pileatus*	Not Listed	Not Listed	Not Listed	Secure	S5	3	3
Purple Finch	*Carpodacus purpureus*	Not Listed	Not Listed	Not Listed	Secure	S4S5	9	11
Red-breasted Nuthatch	*Sitta canadensis*	Not Listed	Not Listed	Not Listed	Secure	S4S5	5	6
Red-eyed Vireo	*Vireo olivaceus*	Not Listed	Not Listed	Not Listed	Secure	S5B	6	9
Red-tailed Hawk	*Buteo jamaicensis*	Not Listed	Not Listed	Not at Risk	Secure	S5	1	1
Ruby-crowned Kinglet	*Regulus calendula*	Not Listed	Not Listed	Not Listed	Sensitive	S4B	3	3
Ruffed Grouse	*Bonasa umbellus*	Not Listed	Not Listed	Not Listed	Secure	S4S5	4	4
White-throated Sparrow	*Zonotrichia albicollis*	Not Listed	Not Listed	Not Listed	Secure	S5B	4	8
Wilson's Warbler	*Wilsonia pusilla*	Not Listed	Not Listed	Not Listed	Sensitive	S3S4B	1	1
Yellow-rumped Warbler	*Dendroica coronata*	Not Listed	Not Listed	Not Listed	Secure	S5B	5	5

Date	Location	Coordinates (UTM NAD83)	Habitat	Conditions				Start Time	End Time	Common Name	Number Observed	Notes
				Wind Speed and Direction	Temperature °C	Sky	Precipitation					
17-Sep-13	STHAWK1	419456 E; 4974326 N	Edge of cutover along south facing slope	20 km/h NW	10	Clear	None	10:55 AM	1:00 PM	Broad-winged Hawk	1	Flying to W at an approximate height of 50 m

Date	Transect Number	Habitat	Conditions				Time	Common Name	Number Observed	Distance to Observer (m)
			Wind Speed and Direction	Temperature °C	Sky	Precipitation				
25-Oct-13	STC1	Along Ellershouse Road	Calm	5	Clear	None	10:45 AM	American Crow	2	100+
...	...	...	...	...	...	...	...	Black-capped Chickadee	3	0-50

Table G13: 2016 Project Site Fall Migration Surveys, Detailed Results, Ellershouse Wind Farm Expansion *Project # 16-5807*

Date	Pointcount ID	Transect Habitat	Transect Enpoint Coordinates (NAD 83)	Conditions				Time	Common Name	Number Observed	Distance to Observer (m)	Notes
				Wind Speed and Direction	Temperature °C	Sky	Precipitation					
05-Oct-16	85	Un-even aged mixed wood near clearcut	419460mE; 4974512mN	<10km/h from North	0	Clear	none	7:00 AM	Blue Jay	1	0-50	...
...	...	...	...	...	...	...	...	...	American Goldfinch	2	0-50	...
...	...	...	...	...	...	...	...	...	Dark-eyed Junco	2	0-50	...
...	...	...	...	...	...	...	...	...	Song Sparrow	1	0-50	...
05-Oct-16	86	Mature softwood near clearcut and swamp	419423mE; 4974206mN	<10km/h from North	0	Clear	none	7:18 AM	Northern Flicker	1	100+	...
...	...	...	...	...	...	...	...	...	White-winged Crossbill	1	0-50	...
05-Oct-16	87	Un-even aged mixed wood	419445mE; 4973961mN	<10km/h from North	0	Clear	none	7:35 AM	Blue Jay	1	0-50	...
...	...	...	...	...	...	...	...	...	Northern Flicker	1	100+	...
...	...	...	...	...	...	...	...	...	American Crow	1	100+	...
05-Oct-16	88	Mature mixed wood	419694mE; 4974464mN	<10km/h from North	0	Clear	none	8:15 AM	Black-capped Chickadee	2	0-50	...
...	...	...	...	...	...	...	...	...	Blue Jay	1	100+	...
05-Oct-16	89	Un-even aged mixed wood	419210mE; 4974581mN	<10km/h from North	0	Clear	none	8:34 AM	White-throated Sparrow	1	0-50	...
...	...	...	...	...	...	...	...	...	Common Raven	1	100+	...
...	...	...	...	...	...	...	...	...	Mourning Dove	2	100+	...
...	...	...	...	...	...	...	...	...	American Goldfinch	2	0-50	...
...	...	...	...	...	...	...	...	...	Downy Woodpecker	1	0-50	...
05-Oct-16	90	Un-even aged mixed wood near clearcut	418842mE; 4974571mN	<10km/h from North	5	Clear	none	8:48 AM	Blue Jay	1	50-100	...
...	...	...	...	...	...	...	...	...	Song Sparrow	1	0-50	...
...	...	...	...	...	...	...	...	...	Black-throated Green Warble	1	0-50	...
...	...	...	...	...	...	...	...	...	Pine Siskin	2	0-50	...
05-Oct-16	91	Un-even aged mixed wood near clearcut	418520mE; 4974457mN	<10km/h from North	5	Clear	none	9:05 AM	Blue Jay	1	100+	...
...	...	...	...	...	...	...	...	...	Northern Flicker	1	100+	...
...	...	...	...	...	...	...	...	...	American Robin	1	0-50	...
...	...	...	...	...	...	...	...	...	Black-capped Chickadee	4	50-100	Migratory flock
05-Oct-16	92	Middle aged mixed wood near clearcut	418646mE; 4974196mN	<10km/h from North	5	Clear	none	9:19 AM	Dark-eyed Junco	8	0-50	Migratory flock
...	...	...	...	...	...	...	...	...	Swainson's Thrush	2	0-50	...
...	...	...	...	...	...	...	...	...	Blue Jay	3	100+	...
...	...	...	...	...	...	...	...	...	Magnolia Warbler	1	50-100	...
...	...	...	...	...	...	...	...	...	Song Sparrow	2	0-50	...
...	...	...	...	...	...	...	...	...	American Robin	2	0-50	...
...	...	...	...	...	...	...	...	...	Yellow-bellied Sapsucker	2	50-100	...
05-Oct-16	93	Un-even aged mixed wood	418772mE; 4973851mN	<10km/h from North	5	Clear	none	9:35 AM	Dark-eyed Junco	3	50-100	...
...	...	...	...	...	...	...	...	...	Black-capped Chickadee	6	0-50	Migratory flock
...	...	...	...	...	...	...	...	...	Northern Flicker	2	50-100	...
...	...	...	...	...	...	...	...	...	Golden-crowned Kinglet	4	0-50	Migratory flock

Table G13: 2016 Project Site Fall Migration Surveys, Detailed Results, Ellershouse Wind Farm Expansion *Project # 16-5807*

Date	Pointcount ID	Transect Habitat	Transect Enpoint Coordinates (NAD 83)	Conditions				Time	Common Name	Number Observed	Distance to Observer (m)	Notes
				Wind Speed and Direction	Temperature °C	Sky	Precipitation					
05-Oct-16	94	Un-even aged mixed wood near small swamp	418153mE; 4974217mN	<10km/h from North	5	Clear	none	9:59 AM	White-throated Sparrow	1	0-50	...
05-Oct-16	95	Un-even aged mixed wood	417864mE; 4974256mN	<10km/h from North	5	Clear	none	10:15 AM	Ring-necked Pheasant	1	0-50	...
25-Oct-16	85	Un-even aged mixed wood near clearcut	419460mE; 4974512mN	10-20km/h from Southeast	3	Overcast	None	7:22 AM	Black-capped Chickadee	2	0-50	...
...	...	...	...	...	...	...	...	...	Dark-eyed Junco	2	0-50	...
...	...	...	...	...	...	...	...	...	American Robin	1	100+	...
25-Oct-16	86	Mature softwood near clearcut and swamp	419423mE; 4974206mN	10-20km/h from Southeast	3	Overcast	None	7:36 AM	Blue Jay	1	50-100	...
...	...	...	...	...	...	...	...	...	Blue Jay	3	100+	...
...	...	...	...	...	...	...	...	...	American Robin	6	0-50	Migratory flock
...	...	...	...	...	...	...	...	...	American Robin	1	50-100	...
...	...	...	...	...	...	...	...	...	Black-capped Chickadee	3	50-100	...
...	...	...	...	...	...	...	...	...	Golden-crowned Kinglet	6	0-50	Migratory flock
25-Oct-16	87	Un-even aged mixed wood	419445mE; 4973961mN	10-20km/h from Southeast	3	Cloudy	None	7:52 AM	Common Grackle	1		Flyover to North at 50m
...	...	...	...	...	...	...	...	...	Gray Jay	3	50-100	...
...	...	...	...	...	...	...	...	...	Yellow-bellied Sapsucker	1	50-100	...
25-Oct-16	88	Mature mixed wood	419210mE; 4974581mN	10-20km/h from Southeast	3	Cloudy	None	8:23 AM	Common Raven	2	100+	...
...	...	...	...	...	...	...	...	...	Black-capped Chickadee	2	0-50	Mixed species migratory flock
...	...	...	...	...	...	...	...	...	Golden-crowned Kinglet	4	0-50	Mixed species migratory flock
...	...	...	...	...	...	...	...	...	Dark-eyed Junco	2	0-50	Mixed species migratory flock
25-Oct-16	89	Un-even aged mixed wood	419694mE; 4974464mN	10-20km/h from Southeast	3	Cloudy	None	8:37 AM	Dark-eyed Junco	2	0-50	...
...	...	...	...	...	...	...	...	...	Blue Jay	2	100+	...
...	...	...	...	...	...	...	...	...	Common Raven	2	100+	...
...	...	...	...	...	...	...	...	...	Mourning Dove	1	100+	...
25-Oct-16	90	Un-even aged mixed wood near clearcut	418842mE; 4974571mN	10-20km/h from Southeast	3	Cloudy	None	8:52 AM	Blue Jay	1	100+	...
25-Oct-16	91	Un-even aged mixed wood near clearcut	418520mE; 4974457mN	10-20km/h from Southeast	3	Cloudy	None	9:10 AM	Common Raven	3	100+	...
...	...	...	...	...	...	...	...	...	Dark-eyed Junco	2	0-50	...
...	...	...	...	...	...	...	...	...	Golden-crowned Kinglet	3	0-50	Migratory flock
25-Oct-16	92	Middle aged mixed wood near clearcut	418646mE; 4974196mN	10-20km/h from Southeast	3	Cloudy	None	9:18 AM	Great Horned Owl	1	100+	...
...	...	...	...	...	...	...	...	...	Dark-eyed Junco	3	0-50	...
...	...	...	...	...	...	...	...	...	American Crow	2	100+	...
...	...	...	...	...	...	...	...	...	Common Raven	3	100+	...
...	...	...	...	...	...	...	...	...	Song Sparrow	2	0-50	...

Table G13: 2016 Project Site Fall Migration Surveys, Detailed Results, Ellershouse Wind Farm Expansion *Project # 16-5807*

Date	Pointcount ID	Transect Habitat	Transect Enpoint Coordinates (NAD 83)	Conditions				Time	Common Name	Number Observed	Distance to Observer (m)	Notes
				Wind Speed and Direction	Temperature °C	Sky	Precipitation					
25-Oct-16	93	Un-even aged mixed wood	418772mE; 4973851mN	10-20km/h from Southeast	3	Cloudy	None	9:35 AM	Common Raven	1	0-50	...
...	...	...	...	...	...	...	...	...	Black-capped Chickadee	3	0-50	...
...	...	...	...	...	...	...	...	...	Common Grackle	1		Flyover to North at 50m
...	...	...	...	...	...	...	...	...	American Crow	3	100+	...
25-Oct-16	94	Un-even aged mixed wood near small swamp	418153mE; 4974217mN	10-20km/h from Southeast	3	Cloudy	None	9:50 AM	Common Raven	1	0-50	...
...	...	...	...	...	...	...	...	...	American Crow	1	0-50	...
...	...	...	...	...	...	...	...	...	American Goldfinch	2	50-100	...
25-Oct-16	95	Un-even aged mixed wood	417864mE; 4974256mN	10-20km/h from Southeast	3	Cloudy	None	10:10 AM	American Crow	1	0-100	...
...	...	...	...	...	...	...	...	...	American Crow	1	100+	...
...	...	...	...	...	...	...	...	...	Dark-eyed Junco	2	0-50	...

Table G14: 2016 Project Site Fall Migration Surveys, Results Summary, Ellershouse Wind Farm Expansion ***Project # 16-5807***

Common Name	Scientific Name	SARA Status	NSESA Status	COSEWIC Status	NSDNR Status	NS S-Rank	Number of Individuals Observed
Blue Jay	*Cyanocitta cristata*	Not Listed	Not Listed	Not Listed	Secure	S5	15
American Goldfinch	*Spinus tristis*	Not Listed	Not Listed	Not Listed	Secure	S5	6
Dark-eyed Junco	*Junco hyemalis*	Not Listed	Not Listed	Not Listed	Secure	S4S5	26
Song Sparrow	*Melospiza melodia*	Not Listed	Not Listed	Not Listed	Secure	S5B	6
Northern Flicker	*Colaptes auratus*	Not Listed	Not Listed	Not Listed	Secure	S5B	5
White-winged Crossbill	*Loxia leucoptera*	Not Listed	Not Listed	Not Listed	Secure	S4S5	1
Blue Jay	*Cyanocitta cristata*	Not Listed	Not Listed	Not Listed	Secure	S5	15
American Crow	*Corvus brachyrhynchos*	Not Listed	Not Listed	Not Listed	Secure	S5	9
Black-capped Chickadee	*Poecile atricapillus*	Not Listed	Not Listed	Not Listed	Secure	S5	22
White-throated Sparrow	*Zonotrichia albicollis*	Not Listed	Not Listed	Not Listed	Secure	S5B	2
Common Raven	*Corvus corax*	Not Listed	Not Listed	Not Listed	Secure	S5	13
Mourning Dove	*Zenaida macroura*	Not Listed	Not Listed	Not Listed	Secure	S5	3
Downy Woodpecker	*Picoides pubescens*	Not Listed	Not Listed	Not Listed	Secure	S5	1
Black-throated Green Warbler	*Dendroica virens*	Not Listed	Not Listed	Not Listed	Secure	S4S5B	1
Pine Siskin	*Spinus pinus*	Not Listed	Not Listed	Not Listed	Sensitive	S3S4B, S5N	2
American Robin	*Turdus migratorius*	Not Listed	Not Listed	Not Listed	Secure	S5B	11
Swainson's Thrush	*Catharus ustulatus*	Not Listed	Not Listed	Not Listed	Secure	S4S5B	2
Magnolia Warbler	*Dendroica magnolia*	Not Listed	Not Listed	Not Listed	Secure	S5B	1
Yellow-bellied Sapsucker	*Sphyrapicus varius*	Not Listed	Not Listed	Not Listed	Secure	S4S5B	3
Golden-crowned Kinglet	*Regulus satrapa*	Not Listed	Not Listed	Not Listed	Sensitive	S4	17
Ring-necked Pheasant	*Phasianus colchicus*	Not Listed	Not Listed	Not Listed	Exotic	SNA	1
Common Grackle	*Quiscalus quiscula*	Not Listed	Not Listed	Not Listed	Secure	S5B	2
Gray Jay	*Perisoreus canadensis*	Not Listed	Not Listed	Not Listed	Sensitive	S3S4	3
Great Horned Owl	*Bubo virginianus*	Not Listed	Not Listed	Not Listed	Secure	S5	1

Table G15: Project Site Winter Surveys, Detailed Results, Ellershouse Wind Farm *Project # 16-5807*

Date	Transect Number	Transect Startpoint Coordinates (NAD 83)	Transect Enpoint Coordinates (NAD 83)	Habitat	Conditions				Time	Common Name	Number Observed	Distance to Observer (m)	Flyover Direction
					Wind Speed and Direction	Temperature °C	Sky	Precipitation					
07-Dec-13	ST1	418901 E; 4976197 N	419036 E; 4975933 N	Young hardwoods transitioning to mid-aged hardwoods along woods road	<10 km/h NE	-3	Overcast	None	7:32 AM	American Crow	2	100+	…
…	ST2	419036 E: 4975933 N	419302 E; 4975769 N	Mid-aged to mature hardwoods along woods road	<10 km/h NE	-3	Overcast	None	7:40 AM	Black-capped Chickadee	2	0-50	…
…	…	…	…	…	…	…	…	…	…	Black-capped Chickadee	2	0-50	…
…	…	…	…	…	…	…	…	…	…	Golden-crowned Kinglet	1	0-50	…
…	ST13	419302E; 4975769 N	419604 E; 4975695 N	Mid-aged to mature hardwoods along woods road	<10 km/h NE	-3	Overcast	None	7:46 AM	Common Raven	1	100+	…
…	…	…	…	…	…	…	…	…	…	Purple Finch	1	FO	S
…	ST3	419604 E; 4975695 N	419985 E; 4975669 N	Early successional transitioning to mid-aged mixed-woods along road	<10 km/h NE	-3	Overcast	None	7:53 AM	Blue Jay	6	…	to north under 50m
…	ST4	419985 E; 4975669 N	419919 E; 4975267 N	Mid-aged mixedwoods transitioning to mid-aged hardwoods along road	<10 km/h NE	-3	Overcast	None	7:58 AM	Black-capped Chickadee	3	0-50	…
…	…	…	…	…	…	…	…	…	…	Golden-crowned Kinglet	1	0-50	…
…	ST5	419919 E; 4975267 N	419762 E; 4974962 N	Mid-aged hardwoods along road, transitioning to easrly successional adjacent to cutover	<10 km/h NE	-3	Overcast	None	8:08 AM	Black-capped Chickadee	2	0-50	…
…	…	…	…	…	…	…	…	…	…	Golden-crowned Kinglet	2	0-50	…
…	ST6	419762 E; 4974962 N	419558 E; 4974947 N	Early successional along road adjacent to cutover transitioning to young hardwoods	<10 km/h NE	-3	Overcast	None	8:19 AM	Black-capped Chickadee	6	0-50	…
…	…	…	…	…	…	…	…	…	…	Golden-crowned Kinglet	2	0-50	…
…	ST14	418761 E; 4974536 N	419639 E; 4974794 N	Young to mid-aged hardwoods adjacent to cutover	<10 km/h NE	-3	Overcast	None	8:42 AM	Golden-crowned Kinglet	2	0-50	…
…	ST7	419639 E; 4974794 N	419454E; 4974522 N	Mid-aged to mature hardwoods along road	<10 km/h NE	-3	Overcast	None	8:48 AM	American Goldfinch	1	100+	…
…	…	…	…	…	…	…	…	…	…	Black-capped Chickadee	6	0-50	…
…	…	…	…	…	…	…	…	…	…	Blue Jay	1	50-100	…
…	…	…	…	…	…	…	…	…	…	Golden-crowned Kinglet	1	0-50	…
…	…	…	…	…	…	…	…	…	…	Red-breasted Nuthatch	2	50-100	…
…	ST9	419429 E; 4974310 N	419446 E; 4973969 N	Young softwood adjacent to cutover, transitioning to mid-aged mixed-woods along road with small watercourse and alder swamp	<10 km/h NE	-3	Overcast	None	9:00 AM	Golden-crowned Kinglet	1	0-50	…
…	ST16	419762 E; 4974962 N	420051 E; 4974863 N	Shrub hardwood along road; ends to treed swamp adjacent to cutover	<10 km/h NE	-3	Overcast	None	9:25 AM	Golden-crowned Kinglet	1	0-50	…
…	ST10	420051 E; 4974863 N	420359 E; 4974996 N	Alder shrubs with mature hardwoods beyond, transitioning to cutover adjacent to shrub swamp	<10 km/h NE	-3	Overcast	None	9:28 AM	Black-capped Chickadee	5	0-50	…
…	…	…	…	…	…	…	…	…	…	Blue Jay	1	100+	…
…	ST11	420063 E; 4975684 N	420324 E; 4975831 N	Young hardwoods along road, transitioning to young mixed-woods along road adjacent to pit, with mature hardwoods	<10 km/h NE	-3	Overcast	None	9:15 AM	American Goldfinch	1	FO	E
…	ST12	420435 E; 4975781 N	420673 E; 4975605 N	Mixed along road with clearcut	<10 km/h NE	-3	Overcast	None	9:52 AM	Black-capped Chickadee	1	0-50	…
…	…	…	…	…	…	…	…	…	…	Golden-crowned Kinglet	1	0-50	…

Table G16: Project Site Winter Surveys, Results Summary, Ellershouse Wind Farm ***Project # 16-5807***

Common Name	Scientific Name	SARA Status	NSESA Status	COSEWIC Status	NSDNR Status	NS S-Rank	Number of Times Observed	Individuals Observed
American Crow	*Corvus brachyrhynchos*	Not Listed	Not Listed	Not Listed	Secure	S5	1	2
American Goldfinch	*Spinus tristis*	Not Listed	Not Listed	Not Listed	Secure	S5	2	2
Black-capped Chickadee	*Poecile atricapillus*	Not Listed	Not Listed	Not Listed	Secure	S5	8	27
Blue Jay	*Cyanocitta cristata*	Not Listed	Not Listed	Not Listed	Secure	S5	3	8
Common Raven	*Corvus corax*	Not Listed	Not Listed	Not Listed	Secure	S5	1	1
Golden-crowned Kinglet	*Regulus satrapa*	Not Listed	Not Listed	Not Listed	Sensitive	S4	9	12
Purple Finch	*Carpodacus purpureus*	Not Listed	Not Listed	Not Listed	Secure	S4S5	1	1
Red-breasted Nuthatch	*Sitta canadensis*	Not Listed	Not Listed	Not Listed	Secure	S4S5	1	2

Table G17: Control Site Winter Surveys, Detailed Results, Ellershouse Wind Farm *Project # 16-5807*

Date	Transect Number	Habitat	Conditions				Time	Common Name	Number Observed	Distance to Observer (m)
			Wind Speed and Direction	Temperature °C	Sky	Precipitation				
07-Dec-13	STC1	Along Ellershouse Road	<10 km/h NE	-3	Overcast	None	10:13	American Goldfinch	2	50-100
...	...	...	...	...	...	...	...	Blue Jay	1	50-100
...	...	...	...	...	...	...	...	Golden-crowned Kinglet	1	0-50
...	...	...	...	...	...	...	...	Purple Finch	1	50-100

APPENDIX H
SHADOW FLICKER MODELING RESULTS

Table H1: Shadow Flicker Modeling Results, Ellershouse Wind Farm *Project # 16-5807*

ID	Easting (m)	Northing (m)	Elevation (m)	Shadow hours per year (Hrs/Yr)	Shadow days per year (Days/Yr)	Max shadow hours per day (Hrs/Day)
R1	420545.00	4977342.00	84.90	0:00	0	0:00
R2	420326.00	4977410.00	86.30	0:00	0	0:00
R3	420939.00	4977368.00	56.50	0:00	0	0:00
R4	417897.00	4977694.00	58.60	0:00	0	0:00
R5	420380.00	4977101.00	99.30	0:00	0	0:00
R6	418854.00	4977640.00	63.80	0:00	0	0:00
R7	421241.00	4976853.00	64.70	8:10	58	0:15
R8	420728.00	4977510.00	75.20	0:00	0	0:00
R9	420067.00	4977513.00	85.00	0:00	0	0:00
R10	420327.00	4977126.00	106.50	0:00	0	0:00
R11	420359.00	4977426.00	85.30	0:00	0	0:00
R12	420523.00	4977363.00	85.20	0:00	0	0:00
R13	420460.00	4977353.00	89.00	0:00	0	0:00
R14	420807.00	4977525.00	70.00	0:00	0	0:00
R15	419724.00	4977673.00	73.90	0:00	0	0:00
R16	420867.00	4977654.00	65.50	0:00	0	0:00
R17	419626.00	4977806.00	71.00	0:00	0	0:00
R18	421118.00	4977147.00	65.70	0:00	0	0:00
R19	417991.00	4975406.00	81.70	8:01	44	0:15
R20	421204.00	4976997.00	64.70	0:42	10	0:06
R21	421312.00	4976706.00	62.70	3:53	26	0:14
R22	420861.00	4977456.00	59.00	0:00	0	0:00
R23	420580.00	4977346.00	83.00	0:00	0	0:00
R24	420392.00	4977188.00	98.60	0:00	0	0:00
R25	420648.00	4977502.00	75.80	0:00	0	0:00
R26	419640.00	4977767.00	71.00	0:00	0	0:00
R27	420386.00	4977442.00	84.30	0:00	0	0:00
R28	421284.00	4976782.00	63.10	4:59	30	0:15
R29	420568.00	4977278.00	80.90	0:00	0	0:00
R30	417908.00	4977693.00	58.50	0:00	0	0:00
R31	418650.00	4977615.00	67.90	0:00	0	0:00
R32	420935.00	4977647.00	59.80	0:00	0	0:00
R33	418827.00	4977615.00	65.00	0:00	0	0:00
R34	420405.00	4977431.00	84.90	0:00	0	0:00
R35	420195.00	4977454.00	87.50	0:00	0	0:00
R36	420479.00	4977406.00	84.50	0:00	0	0:00
R37	421225.00	4977044.00	61.40	0:00	0	0:00
R38	420516.00	4977223.00	84.60	0:00	0	0:00
R39	419930.00	4977440.00	86.80	0:00	0	0:00
R40	420246.00	4977471.00	83.20	0:00	0	0:00
R41	420438.00	4977442.00	84.10	0:00	0	0:00
R42	419635.00	4977670.00	75.10	0:00	0	0:00
R43	420817.00	4977498.00	67.00	0:00	0	0:00
R44	421200.00	4976902.00	67.30	10:09	42	0:17
R45	418918.00	4977811.00	60.70	0:00	0	0:00
R46	420812.00	4977540.00	69.60	0:00	0	0:00
R47	420450.00	4977265.00	92.70	0:00	0	0:00
R48	421087.00	4977192.00	65.20	0:00	0	0:00
R49	420922.00	4977751.00	64.60	0:00	0	0:00
R50	420710.00	4977427.00	74.00	0:00	0	0:00
R51	420245.00	4977520.00	81.50	0:00	0	0:00
R52	419049.00	4977991.00	61.70	0:00	0	0:00

Table H1: Shadow Flicker Modeling Results, Ellershouse Wind Farm *Project # 16-5807*

ID	Easting (m)	Northing (m)	Elevation (m)	Shadow hours per year (Hrs/Yr)	Shadow days per year (Days/Yr)	Max shadow hours per day (Hrs/Day)
R53	420476.00	4977426.00	83.40	0:00	0	0:00
R54	420483.00	4977199.00	86.50	0:00	0	0:00
R55	419715.00	4977650.00	76.40	0:00	0	0:00
R56	420431.00	4977135.00	92.20	0:00	0	0:00
R57	420534.00	4977461.00	81.80	0:00	0	0:00
R58	420327.00	4977497.00	80.40	0:00	0	0:00
R59	421321.00	4976634.00	64.80	5:15	26	0:17
R60	421216.00	4977087.00	59.40	0:00	0	0:00
R61	421193.00	4977108.00	60.70	0:00	0	0:00
R62	420458.00	4977426.00	84.00	0:00	0	0:00
R63	420543.00	4977140.00	87.60	0:00	0	0:00
R64	420522.00	4977120.00	89.40	0:00	0	0:00
R65	421180.00	4976863.00	72.00	11:07	48	0:17
R66	420486.00	4977450.00	82.30	0:00	0	0:00
R67	420600.00	4977379.00	81.40	0:00	0	0:00
R68	420145.00	4977554.00	83.50	0:00	0	0:00
R69	420539.00	4977221.00	81.70	0:00	0	0:00
R70	417991.00	4975384.00	74.80	3:45	19	0:15
R71	420482.00	4977347.00	87.90	0:00	0	0:00
R72	420737.00	4977464.00	73.30	0:00	0	0:00
R73	420319.00	4977457.00	83.00	0:00	0	0:00
R74	420929.00	4977706.00	64.80	0:00	0	0:00
R75	420562.00	4977324.00	83.50	0:00	0	0:00
R76	421255.00	4976867.00	61.80	7:30	58	0:15
R77	420353.00	4977182.00	103.80	0:00	0	0:00
R78	420665.00	4977094.00	89.80	0:00	0	0:00
R79	420434.00	4977407.00	86.30	0:00	0	0:00
R80	421113.00	4976898.00	74.60	4:03	24	0:13
R81	420319.00	4977275.00	100.10	0:00	0	0:00
R82	420397.00	4977128.00	96.70	0:00	0	0:00
R83	421163.00	4977124.00	62.80	0:00	0	0:00
R84	420392.00	4977492.00	81.50	0:00	0	0:00
R85	420554.00	4977471.00	81.40	0:00	0	0:00
R86	421174.00	4977104.00	63.50	0:00	0	0:00
R87	421391.00	4976480.00	71.10	4:56	23	0:17
R88	421416.00	4976615.00	56.50	4:39	24	0:16
R89	420724.00	4977455.00	73.80	0:00	0	0:00
R90	418981.00	4977975.00	54.20	0:00	0	0:00
R91	421199.00	4976959.00	63.10	5:07	28	0:13
R92	421236.00	4977047.00	59.60	0:00	0	0:00
R93	419642.00	4977828.00	71.00	0:00	0	0:00
R94	420392.00	4977478.00	82.60	0:00	0	0:00
R95	418936.00	4977774.00	65.20	0:00	0	0:00
R96	420800.00	4977376.00	64.20	0:00	0	0:00
R97	420799.00	4977514.00	70.40	0:00	0	0:00
R98	420840.00	4977675.00	66.00	0:00	0	0:00
R99	421247.00	4976979.00	59.30	6:26	33	0:14
R100	420685.00	4977117.00	88.30	0:00	0	0:00
R101	421225.00	4976811.00	70.10	7:42	50	0:16
R102	420446.00	4977141.00	90.40	0:00	0	0:00
R103	420447.00	4977172.00	89.20	0:00	0	0:00
R104	419714.00	4977684.00	73.00	0:00	0	0:00

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Table H1: Shadow Flicker Modeling Results, Ellershouse Wind Farm *Project # 16-5807*

ID	Easting (m)	Northing (m)	Elevation (m)	Shadow hours per year (Hrs/Yr)	Shadow days per year (Days/Yr)	Max shadow hours per day (Hrs/Day)
R105	418814.00	4977605.00	65.50	0:00	0	0:00
R106	420705.00	4977437.00	74.00	0:00	0	0:00
R107	420192.00	4977649.00	86.80	0:00	0	0:00
R108	420335.00	4977251.00	101.70	0:00	0	0:00
R109	420840.00	4977403.00	62.30	0:00	0	0:00
R110	419923.00	4977515.00	83.00	0:00	0	0:00
R111	421244.00	4976903.00	61.40	10:06	50	0:16
R112	420533.00	4977406.00	83.60	0:00	0	0:00
R113	418980.00	4977957.00	56.00	0:00	0	0:00
R114	419641.00	4977816.00	71.00	0:00	0	0:00
R115	420352.00	4977490.00	80.80	0:00	0	0:00
R116	421290.00	4976747.00	64.10	3:35	24	0:14
R117	420415.00	4977497.00	82.00	0:00	0	0:00
R118	421069.00	4977183.00	69.00	0:00	0	0:00
R119	420957.00	4977654.00	57.80	0:00	0	0:00
R120	420495.00	4977343.00	87.20	0:00	0	0:00
R121	420256.00	4977654.00	85.40	0:00	0	0:00
R122	420901.00	4977617.00	63.20	0:00	0	0:00
R123	420678.00	4977472.00	76.50	0:00	0	0:00
R124	420644.00	4977424.00	78.90	0:00	0	0:00
R125	421254.00	4976929.00	58.70	10:05	46	0:16
R126	419903.00	4977545.00	82.90	0:00	0	0:00
R127	419765.00	4977547.00	85.00	0:00	0	0:00
R128	420359.00	4977277.00	98.60	0:00	0	0:00
R129	420419.00	4977416.00	86.20	0:00	0	0:00
R130	420226.00	4977459.00	84.70	0:00	0	0:00
R131	420420.00	4977387.00	89.00	0:00	0	0:00
R132	419687.00	4977684.00	73.40	0:00	0	0:00
R133	420522.00	4977297.00	85.90	0:00	0	0:00
R134	420344.00	4977450.00	83.70	0:00	0	0:00
R135	420754.00	4977479.00	72.40	0:00	0	0:00
R136	419630.00	4977686.00	73.90	0:00	0	0:00
R137	420990.00	4977743.00	62.20	0:00	0	0:00
R138	420634.00	4977358.00	78.70	0:00	0	0:00
R139	420498.00	4977385.00	85.30	0:00	0	0:00
R140	420399.00	4977438.00	84.60	0:00	0	0:00
R141	420785.00	4977557.00	71.40	0:00	0	0:00
R142	421276.00	4976800.00	63.00	5:42	34	0:15
R143	420927.00	4977623.00	59.50	0:00	0	0:00
R144	420341.00	4977295.00	97.10	0:00	0	0:00
R145	420940.00	4977348.00	57.80	0:00	0	0:00
R146	421380.00	4976499.00	70.50	5:02	23	0:17
R147	421317.00	4976578.00	69.20	5:30	26	0:17
R148	420453.00	4977335.00	90.30	0:00	0	0:00
R149	420720.00	4977491.00	75.50	0:00	0	0:00
R150	421132.00	4977145.00	64.30	0:00	0	0:00
R151	421127.00	4976910.00	71.80	4:12	25	0:12
R152	417888.00	4977695.00	58.60	0:00	0	0:00
R153	420427.00	4977467.00	83.30	0:00	0	0:00
R154	420406.00	4977418.00	85.90	0:00	0	0:00
R155	420406.00	4977374.00	90.40	0:00	0	0:00
R156	420458.00	4977384.00	87.20	0:00	0	0:00

Table H1: Shadow Flicker Modeling Results, Ellershouse Wind Farm *Project # 16-5807*

ID	Easting (m)	Northing (m)	Elevation (m)	Shadow hours per year (Hrs/Yr)	Shadow days per year (Days/Yr)	Max shadow hours per day (Hrs/Day)
R157	420407.00	4977121.00	95.90	0:00	0	0:00
R158	420605.00	4977316.00	78.30	0:00	0	0:00
R159	420684.00	4977384.00	77.50	0:00	0	0:00
R160	420747.00	4977518.00	74.20	0:00	0	0:00
R161	421255.00	4976898.00	60.20	9:23	52	0:16
R162	420771.00	4977495.00	71.70	0:00	0	0:00
R163	420242.00	4977538.00	80.10	0:00	0	0:00
R164	420631.00	4977410.00	79.90	0:00	0	0:00
R165	420621.00	4977325.00	77.00	0:00	0	0:00
R166	420222.00	4976813.00	136.90	0:00	0	0:00
R167	420207.00	4976811.00	136.90	0:00	0	0:00
R168	420322.00	4977249.00	102.80	0:00	0	0:00
R169	420329.00	4977232.00	103.70	0:00	0	0:00
R170	420476.00	4977191.00	86.60	0:00	0	0:00
R171	420432.00	4977526.00	80.60	0:00	0	0:00
R172	420916.00	4977696.00	65.30	0:00	0	0:00
R173	420252.00	4977694.00	86.60	0:00	0	0:00
R174	420214.00	4977654.00	86.50	0:00	0	0:00
R175	421235.00	4976962.00	59.50	7:29	36	0:15
R176	421274.00	4976762.00	65.20	4:27	28	0:15
R177	421239.00	4976780.00	69.40	6:20	38	0:16
R178	421417.00	4976638.00	54.90	4:45	24	0:16
R179	418668.00	4977602.00	68.20	0:00	0	0:00
R180	419640.00	4977873.00	68.60	0:00	0	0:00
R181	419626.00	4977845.00	70.60	0:00	0	0:00
R182	419632.00	4977765.00	71.00	0:00	0	0:00
R183	419673.00	4977569.00	84.50	0:00	0	0:00
R184	419612.00	4977605.00	80.40	0:00	0	0:00
R185	419560.00	4977519.00	84.50	0:00	0	0:00
R186	419500.00	4977444.00	87.00	0:00	0	0:00
R187	420486.00	4977325.00	88.40	0:00	0	0:00
R188	420732.00	4977554.00	74.20	0:00	0	0:00
R189	420691.00	4977545.00	74.40	0:00	0	0:00
R190	415921.00	4974400.00	89.20	0:00	0	0:00
R191	416008.00	4973978.00	89.30	0:00	0	0:00
R192	416580.00	4974321.00	87.70	5:24	24	0:18
R193	418875.00	4971688.00	161.20	0:00	0	0:00
R194	420803.00	4976984.00	113.80	0:00	0	0:00

APPENDIX I
EMI CORRESPONDENCE RESPONSES

Tanya Cooper <tcooper@strum.com>

Fwd: RE: Ellershouse Wind Farm

1 message

Shawn Duncan <sduncan@strum.com> Wed, Nov 9, 2016 at 8:46 AM
To: Tanya Cooper <tcooper@strum.com>

---------- Forwarded message ----------
From: Chris Peters <chris.peters@minasenergy.com>
Date: Mon, Nov 7, 2016 at 6:19 PM
Subject: Fwd: RE: Ellershouse Wind Farm
To: Megan Henley <mhenley@strum.com>, Shawn Duncan <SDuncan@strum.com>

---------- Forwarded message ----------
From: "CCG Wind Farm Coordinator / Coordinateur Parcs Eoliens GCC (DFO/MPO)" <WindfarmCoordinator.XNCR@dfo-mpo.gc.ca>
Date: Nov 7, 2016 6:00 PM
Subject: RE: Ellershouse Wind Farm
To: "Chris Peters" <chris.peters@minasenergy.com>
Cc:

Hello,

The proposed wind farm (Ellershouse) is located 42 km away from the Shannon Hill radar site and 47 km away from the Georges Island radar site and 59 km away from the Chebucto Head radar site.

Even though it is located within the 60 km consultation zone, it is located beyond the areas covered by the radars. Therefore no interference issues are anticipated.

Regards / Salutations,

Martin Grégoire, P. Eng

Canadian Coast Guard

From: Chris Peters [mailto:chris.peters@minasenergy.com]
Sent: November-04-16 9:08 AM
To: CCG Wind Farm Coordinator / Coordinateur Parcs Eoliens GCC (DFO/MPO)
Subject: Ellershouse Wind Farm

Good morning,

Attached are the coordinates and elevations of 7 new turbines locations at the Ellershouse Wind farm located near Ellerhouse, NS. Turbines 1-7 represent the existing installation and turbines 8-14 are turbine coordinates for the proposed

Tanya Cooper <tcooper@strum.com>

Fwd: Ellershouse Wind Farm Expansion

1 message

Shawn Duncan <sduncan@strum.com> Wed, Nov 9, 2016 at 8:45 AM
To: Tanya Cooper <tcooper@strum.com>

---------- Forwarded message ----------
From: Chris Peters <chris.peters@minasenergy.com>
Date: Mon, Nov 7, 2016 at 12:50 PM
Subject: Fwd: Ellershouse Wind Farm Expansion
To: Megan Henley <mhenley@strum.com>
Cc: Shawn Duncan <SDuncan@strum.com>

See below.

Chris Peters
Minas Energy
Phone: (902) 799-0365
Email: chris.peters@minasenergy.com

---------- Forwarded message ----------
From: Radars Météo / Weather Radars (EC) <ec.radarsmeteo-weatherradars.ec@canada.ca>
Date: Mon, Nov 7, 2016 at 12:15 PM
Subject: RE: Ellershouse Wind Farm Expansion
To: Chris Peters <chris.peters@minasenergy.com>
Cc: "Radars Météo / Weather Radars (EC)" <ec.radarsmeteo-weatherradars.ec@canada.ca>, "Young, Jim (EC)" <jim.young@canada.ca>

Dear Mr. Chris Peters,

Thank you for contacting the Meteorological Service of Canada, a branch of Environment and Climate Change Canada, regarding your wind energy intentions.

Our preliminary assessment of the information provided to us via e-mail on November 3, 2016 indicates that any potential interference that may be created by the Ellershouse wind farm, located near Ellershouse, NS will not be severe. Although we would prefer our radar view to be interference free, this is not always reasonable. As a consequence, we do not have strong objections to the current proposal.

If your plans are modified in any manner (e.g. number of turbines, height, placement or materials) this analysis would no longer be valid. An updated analysis must be conducted.

Please contact us at: ec.radarsmeteo-weatherradars.ec@canada.ca

Thank you for your ongoing cooperation and we wish you success.

Best Regards,

Ingrid Wong

Junior Physical Scientist, Meteorological Service of Canada

Environment and Climate Change Canada / Government of Canada

ingrid.wong@canada.ca / Tel: +1 416-739-4508

Scientifique junior, Service météorologique du Canada

Environnement et Changement climatique Canada / Gouvernement du Canada

ingrid.wong@canada.ca / Tél: +1 416-739-4508

From: Chris Peters [mailto:chris.peters@minasenergy.com]
Sent: November 3, 2016 11:33 AM
To: Radars Météo / Weather Radars (EC)
Subject: Ellershouse Wind Farm Expansion

Good morning,

Attached are the coordinates and elevations of 7 new turbines locations at the Ellershouse Wind farm located near Ellerhouse, NS. Turbines 1-7 represent the existing installation and turbines 8-14 are turbine coordinates for the proposed expansion project. A site map of the expansion project is also attached.

This correspondence represents a request to conduct an assessment of the impact of the proposed turbines in relation to the operations of Environment Canada.

Thank you,

Chris Peters

Minas Energy

Phone: (902) 799-0365

Email: chris.peters@minasenergy.com

APPENDIX J
SOUND MODELING RESULTS

Table J1: Sound Modeling Results, Ellershouse Wind Farm *Project # 16-5807*

ID	Easting (m)	Northing (m)	Noise Demand [dB(A)]	Level From WTGs [dB(A)]	Distance to Demand (m)	Demands Fulfilled?
R1	420545.00	4977343.00	40.00	32.50	895.00	Yes
R2	420326.00	4977411.00	40.00	32.50	919.00	Yes
R3	420939.00	4977369.00	40.00	31.50	1058.00	Yes
R4	417897.00	4977695.00	40.00	29.70	1297.00	Yes
R5	420380.00	4977102.00	40.00	34.30	623.00	Yes
R6	418854.00	4977641.00	40.00	31.70	998.00	Yes
R7	421241.00	4976854.00	40.00	33.20	801.00	Yes
R8	420728.00	4977511.00	40.00	31.30	1109.00	Yes
R9	420067.00	4977514.00	40.00	32.20	1004.00	Yes
R10	420327.00	4977127.00	40.00	34.20	638.00	Yes
R11	420359.00	4977427.00	40.00	32.30	939.00	Yes
R12	420523.00	4977364.00	40.00	32.40	910.00	Yes
R13	420460.00	4977354.00	40.00	32.60	886.00	Yes
R14	420807.00	4977526.00	40.00	31.00	1150.00	Yes
R15	419724.00	4977674.00	40.00	31.60	1183.00	Yes
R16	420867.00	4977655.00	40.00	30.30	1292.00	Yes
R17	419626.00	4977807.00	40.00	31.00	1306.00	Yes
R18	421118.00	4977148.00	40.00	32.10	956.00	Yes
R19	417991.00	4975407.00	40.00	39.10	139.00	Yes
R20	421204.00	4976998.00	40.00	32.60	887.00	Yes
R21	421312.00	4976707.00	40.00	33.70	740.00	Yes
R22	420861.00	4977457.00	40.00	31.20	1106.00	Yes
R23	420580.00	4977347.00	40.00	32.40	908.00	Yes
R24	420392.00	4977189.00	40.00	33.70	710.00	Yes
R25	420648.00	4977503.00	40.00	31.50	1077.00	Yes
R26	419640.00	4977768.00	40.00	31.20	1274.00	Yes
R27	420386.00	4977443.00	40.00	32.20	959.00	Yes
R28	421284.00	4976783.00	40.00	33.40	777.00	Yes
R29	420568.00	4977279.00	40.00	32.80	840.00	Yes
R30	417908.00	4977694.00	40.00	29.80	1291.00	Yes
R31	418650.00	4977616.00	40.00	31.60	984.00	Yes
R32	420935.00	4977648.00	40.00	30.20	1311.00	Yes
R33	418827.00	4977616.00	40.00	31.80	973.00	Yes
R34	420405.00	4977432.00	40.00	32.30	952.00	Yes
R35	420195.00	4977455.00	40.00	32.40	949.00	Yes
R36	420479.00	4977407.00	40.00	32.30	941.00	Yes
R37	421225.00	4977045.00	40.00	32.30	936.00	Yes
R38	420516.00	4977224.00	40.00	33.20	773.00	Yes
R39	419930.00	4977441.00	40.00	32.80	933.00	Yes
R40	420246.00	4977472.00	40.00	32.30	970.00	Yes
R41	420438.00	4977443.00	40.00	32.10	968.00	Yes

ID	Easting (m)	Northing (m)	Noise Demand [dB(A)]	Level From WTGs [dB(A)]	Distance to Demand (m)	Demands Fulfilled?
R42	419635.00	4977671.00	40.00	31.70	1181.00	Yes
R43	420817.00	4977499.00	40.00	31.10	1129.00	Yes
R44	421200.00	4976903.00	40.00	33.10	811.00	Yes
R45	418918.00	4977812.00	40.00	30.80	1170.00	Yes
R46	420812.00	4977541.00	40.00	31.00	1166.00	Yes
R47	420450.00	4977266.00	40.00	33.10	798.00	Yes
R48	421087.00	4977193.00	40.00	32.00	977.00	Yes
R49	420922.00	4977752.00	40.00	29.80	1403.00	Yes
R50	420710.00	4977428.00	40.00	31.70	1025.00	Yes
R51	420245.00	4977521.00	40.00	32.00	1019.00	Yes
R52	419049.00	4977992.00	40.00	30.00	1359.00	Yes
R53	420476.00	4977427.00	40.00	32.20	960.00	Yes
R54	420483.00	4977200.00	40.00	33.40	741.00	Yes
R55	419715.00	4977651.00	40.00	31.70	1161.00	Yes
R56	420431.00	4977136.00	40.00	33.90	667.00	Yes
R57	420534.00	4977462.00	40.00	31.90	1008.00	Yes
R58	420327.00	4977498.00	40.00	32.00	1005.00	Yes
R59	421321.00	4976635.00	40.00	34.00	690.00	Yes
R60	421216.00	4977088.00	40.00	32.10	965.00	Yes
R61	421193.00	4977109.00	40.00	32.10	968.00	Yes
R62	420458.00	4977427.00	40.00	32.20	957.00	Yes
R63	420543.00	4977141.00	40.00	33.70	700.00	Yes
R64	420522.00	4977121.00	40.00	33.90	675.00	Yes
R65	421180.00	4976864.00	40.00	33.40	768.00	Yes
R66	420486.00	4977451.00	40.00	32.00	986.00	Yes
R67	420600.00	4977380.00	40.00	32.20	945.00	Yes
R68	420145.00	4977555.00	40.00	31.90	1046.00	Yes
R69	420539.00	4977222.00	40.00	33.20	777.00	Yes
R70	417991.00	4975385.00	40.00	39.10	120.00	Yes
R71	420482.00	4977348.00	40.00	32.60	885.00	Yes
R72	420737.00	4977465.00	40.00	31.50	1069.00	Yes
R73	420319.00	4977458.00	40.00	32.20	964.00	Yes
R74	420929.00	4977707.00	40.00	30.00	1363.00	Yes
R75	420562.00	4977325.00	40.00	32.60	882.00	Yes
R76	421255.00	4976868.00	40.00	33.00	820.00	Yes
R77	420353.00	4977183.00	40.00	33.80	697.00	Yes
R78	420665.00	4977095.00	40.00	33.70	697.00	Yes
R79	420434.00	4977408.00	40.00	32.30	933.00	Yes
R80	421113.00	4976899.00	40.00	33.40	752.00	Yes
R81	420319.00	4977276.00	40.00	33.30	784.00	Yes
R82	420397.00	4977129.00	40.00	34.10	652.00	Yes

ID	Easting (m)	Northing (m)	Noise Demand [dB(A)]	Level From WTGs [dB(A)]	Distance to Demand (m)	Demands Fulfilled?
R83	421163.00	4977125.00	40.00	32.10	963.00	Yes
R84	420392.00	4977493.00	40.00	31.90	1009.00	Yes
R85	420554.00	4977472.00	40.00	31.80	1022.00	Yes
R86	421174.00	4977105.00	40.00	32.10	953.00	Yes
R87	421391.00	4976481.00	40.00	34.50	592.00	Yes
R88	421416.00	4976616.00	40.00	33.70	723.00	Yes
R89	420724.00	4977456.00	40.00	31.50	1056.00	Yes
R90	418981.00	4977976.00	40.00	30.10	1337.00	Yes
R91	421199.00	4976960.00	40.00	32.80	854.00	Yes
R92	421236.00	4977048.00	40.00	32.20	946.00	Yes
R93	419642.00	4977829.00	40.00	30.90	1332.00	Yes
R94	420392.00	4977479.00	40.00	32.00	996.00	Yes
R95	418936.00	4977775.00	40.00	31.00	1134.00	Yes
R96	420800.00	4977377.00	40.00	31.80	1009.00	Yes
R97	420799.00	4977515.00	40.00	31.10	1137.00	Yes
R98	420840.00	4977676.00	40.00	30.30	1302.00	Yes
R99	421247.00	4976980.00	40.00	32.50	900.00	Yes
R100	420685.00	4977118.00	40.00	33.50	726.00	Yes
R101	421225.00	4976812.00	40.00	33.50	759.00	Yes
R102	420446.00	4977142.00	40.00	33.90	676.00	Yes
R103	420447.00	4977173.00	40.00	33.70	706.00	Yes
R104	419714.00	4977685.00	40.00	31.60	1195.00	Yes
R105	418814.00	4977606.00	40.00	31.80	963.00	Yes
R106	420705.00	4977438.00	40.00	31.70	1033.00	Yes
R107	420192.00	4977650.00	40.00	31.40	1144.00	Yes
R108	420335.00	4977252.00	40.00	33.40	762.00	Yes
R109	420840.00	4977404.00	40.00	31.60	1049.00	Yes
R110	419923.00	4977516.00	40.00	32.30	1009.00	Yes
R111	421244.00	4976904.00	40.00	32.90	840.00	Yes
R112	420533.00	4977407.00	40.00	32.20	954.00	Yes
R113	418980.00	4977958.00	40.00	30.10	1319.00	Yes
R114	419641.00	4977817.00	40.00	30.90	1321.00	Yes
R115	420352.00	4977491.00	40.00	32.00	1001.00	Yes
R116	421290.00	4976748.00	40.00	33.50	755.00	Yes
R117	420415.00	4977498.00	40.00	31.90	1018.00	Yes
R118	421069.00	4977184.00	40.00	32.10	960.00	Yes
R119	420957.00	4977655.00	40.00	30.10	1326.00	Yes
R120	420495.00	4977344.00	40.00	32.60	884.00	Yes
R121	420256.00	4977655.00	40.00	31.30	1153.00	Yes
R122	420901.00	4977618.00	40.00	30.40	1270.00	Yes
R123	420678.00	4977473.00	40.00	31.60	1057.00	Yes

ID	Easting (m)	Northing (m)	Noise Demand [dB(A)]	Level From WTGs [dB(A)]	Distance to Demand (m)	Demands Fulfilled?
R124	420644.00	4977425.00	40.00	31.90	1001.00	Yes
R125	421254.00	4976930.00	40.00	32.70	866.00	Yes
R126	419903.00	4977546.00	40.00	32.20	1040.00	Yes
R127	419765.00	4977548.00	40.00	32.30	1053.00	Yes
R128	420359.00	4977278.00	40.00	33.20	792.00	Yes
R129	420419.00	4977417.00	40.00	32.30	939.00	Yes
R130	420226.00	4977460.00	40.00	32.30	956.00	Yes
R131	420420.00	4977388.00	40.00	32.50	911.00	Yes
R132	419687.00	4977685.00	40.00	31.60	1197.00	Yes
R133	420522.00	4977298.00	40.00	32.80	846.00	Yes
R134	420344.00	4977451.00	40.00	32.20	961.00	Yes
R135	420754.00	4977480.00	40.00	31.40	1089.00	Yes
R136	419630.00	4977687.00	40.00	31.60	1194.00	Yes
R137	420990.00	4977744.00	40.00	29.70	1421.00	Yes
R138	420634.00	4977359.00	40.00	32.20	935.00	Yes
R139	420498.00	4977386.00	40.00	32.30	925.00	Yes
R140	420399.00	4977439.00	40.00	32.20	957.00	Yes
R141	420785.00	4977558.00	40.00	30.90	1173.00	Yes
R142	421276.00	4976801.00	40.00	33.30	785.00	Yes
R143	420927.00	4977624.00	40.00	30.30	1286.00	Yes
R144	420341.00	4977296.00	40.00	33.10	807.00	Yes
R145	420940.00	4977349.00	40.00	31.60	1041.00	Yes
R146	421380.00	4976500.00	40.00	34.50	604.00	Yes
R147	421317.00	4976579.00	40.00	34.30	641.00	Yes
R148	420453.00	4977336.00	40.00	32.70	867.00	Yes
R149	420720.00	4977492.00	40.00	31.40	1089.00	Yes
R150	421132.00	4977146.00	40.00	32.10	962.00	Yes
R151	421127.00	4976911.00	40.00	33.30	771.00	Yes
R152	417888.00	4977696.00	40.00	29.70	1303.00	Yes
R153	420427.00	4977468.00	40.00	32.00	991.00	Yes
R154	420406.00	4977419.00	40.00	32.30	939.00	Yes
R155	420406.00	4977375.00	40.00	32.60	896.00	Yes
R156	420458.00	4977385.00	40.00	32.40	916.00	Yes
R157	420407.00	4977122.00	40.00	34.10	648.00	Yes
R158	420605.00	4977317.00	40.00	32.50	887.00	Yes
R159	420684.00	4977385.00	40.00	32.00	976.00	Yes
R160	420747.00	4977519.00	40.00	31.20	1123.00	Yes
R161	421255.00	4976899.00	40.00	32.90	844.00	Yes
R162	420771.00	4977496.00	40.00	31.30	1110.00	Yes
R163	420242.00	4977539.00	40.00	31.90	1037.00	Yes
R164	420631.00	4977411.00	40.00	32.00	984.00	Yes

ID	Easting (m)	Northing (m)	Noise Demand [dB(A)]	Level From WTGs [dB(A)]	Distance to Demand (m)	Demands Fulfilled?
R165	420621.00	4977326.00	40.00	32.40	900.00	Yes
R166	420222.00	4976814.00	40.00	36.70	313.00	Yes
R167	420207.00	4976812.00	40.00	36.80	309.00	Yes
R168	420322.00	4977250.00	40.00	33.40	759.00	Yes
R169	420329.00	4977233.00	40.00	33.50	743.00	Yes
R170	420476.00	4977192.00	40.00	33.50	731.00	Yes
R171	420432.00	4977527.00	40.00	31.70	1050.00	Yes
R172	420916.00	4977697.00	40.00	30.00	1349.00	Yes
R173	420252.00	4977695.00	40.00	31.10	1193.00	Yes
R174	420214.00	4977655.00	40.00	31.30	1150.00	Yes
R175	421235.00	4976963.00	40.00	32.60	879.00	Yes
R176	421274.00	4976763.00	40.00	33.50	755.00	Yes
R177	421239.00	4976781.00	40.00	33.60	745.00	Yes
R178	421417.00	4976639.00	40.00	33.60	743.00	Yes
R179	418668.00	4977603.00	40.00	31.70	969.00	Yes
R180	419640.00	4977874.00	40.00	30.60	1375.00	Yes
R181	419626.00	4977846.00	40.00	30.80	1344.00	Yes
R182	419632.00	4977766.00	40.00	31.20	1269.00	Yes
R183	419673.00	4977570.00	40.00	32.20	1084.00	Yes
R184	419612.00	4977606.00	40.00	32.00	1112.00	Yes
R185	419560.00	4977520.00	40.00	32.50	1013.00	Yes
R186	419500.00	4977445.00	40.00	33.00	923.00	Yes
R187	420486.00	4977326.00	40.00	32.70	864.00	Yes
R188	420732.00	4977555.00	40.00	31.00	1152.00	Yes
R189	420691.00	4977546.00	40.00	31.20	1131.00	Yes
R190	415921.00	4974400.00	40.00	29.00	1377.00	Yes
R191	416008.00	4973978.00	40.00	29.10	1340.00	Yes
R192	416580.00	4974321.00	40.00	32.60	721.00	Yes
R193	418875.00	4971688.00	40.00	28.40	1745.00	Yes
R194	420803.00	4976984.00	40.00	34.00	653.00	Yes