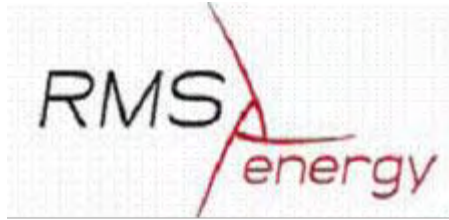


Appendix H

Avian Field Program Information



**Clydesdale Ridge Wind Farm - 2011
Pre-construction Avian Report**

Prepared by Gerald Desjardins



May 11, 2012

Executive Summary

RMSenergy completed a monitoring program to collect data on bird migration and breeding in the Clydesdale Ridge area. The collected data will be used to assess the potential environmental effects of a wind project in the area. This report provides a summary of results of this monitoring program.

Field surveys followed a protocol developed in consideration the information and guidance provided in Environment Canada's Wind Turbines and Birds guidance document (Environment Canada 2007a), and the Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds document (Environment Canada 2007b).

Collected data included relative flight height of all birds detected, of which the vast majority were observed flying or foraging less than 40 m above the ground (typically less than 10 m). A small proportion of birds were noted flying between 40 m and 100 m above ground level, and even fewer birds were seen flying at a height of greater than 100 m.

Breeding bird data near the proposed turbines was limited, in part due to poor weather conditions in June. However, the data collected and the habitat found in the vicinity of turbines does not suggest the Clydesdale area an important area for species at risk.

Due to the limited amount of data from the Breeding Bird survey in 2011, RMSenergy will conduct a full Breeding Bird survey this season (2012). The results of this will be submitted to NSE and CWS upon completion as an addendum to the EA for Clydesdale Ridge Wind Farm.

At this stage, no major concerns have been identified for the Clydesdale Ridge study area.

Table of Contents

EXECUTIVE SUMMARY	E.1
<hr/>	
1.0 INTRODUCTION	1
1.1 BACKGROUND	1
1.1.1 Important Bird Areas	1
<hr/>	
2.0 METHODS	4
2.1 POINT COUNTS	4
2.2 SPRING MIGRATION SURVEYS	6
2.3 BREEDING BIRDS	6
2.4 FALL MIGRATION	6
2.5 RAPTOR WATCH	6
2.6 WINTER SURVEYS	6
<hr/>	
3.0 RESULTS AND DISCUSSION	7
3.1 BIRD SPECIES AND NUMBERS OBSERVED	8
3.1.1 Spring Migration	9
3.1.2 Breeding Birds	10
3.1.3 Fall Migration	12
3.1.4 Winter Surveys	14
3.1.5 Raptor Watches	15
3.2 BEHAVIOUR DATA (MIGRATION)	16
3.2.1 Spring Migration	16
3.2.2 Fall Migration	17
3.3 SPECIES AT RISK	18
<hr/>	
4.0 SUMMARY	19
5.0 REFERENCES	20

CLYDESDALE RIDGE WIND FARM - 2011 PRE-CONSTRUCTION AVIAN REPORT

LIST OF FIGURES

Figure 1	Project Area	2
Figure 2	Important Bird Area Map	3
Figure 3	Bird Survey Locations	5

LIST OF TABLES

Table 1	Relative Height Categories of Birds Recorded During Surveys.....	6
Table 2	Point Counts.....	7
Table 3	Summary of Weather Conditions (Temperature and Wind Speed) during each Site Visit	8
Table 4	Bird Species Observed during Spring Migration at Clydesdale, 2011	9
Table 5	Bird Species Observed during Breeding Bird Surveys at Clydesdale, 2011	10
Table 6	Bird Species Observed during Fall Migration at Clydesdale, 2011	12
Table 7	Bird Species Observed during Winter Surveys at Clydesdale, 2011/2012	14
Table 8	Bird Species Observed during Raptor Watches and In Transit at Clydesdale, 2011	15
Table 9	Overall Activity by Height of the Bird Groups Observed during the Spring Monitoring Period.	17
Table 10	Overall Activity by Height of the Bird Groups Observed during the Fall Monitoring Period.	18

1.0 Introduction

RMSenergy (RMS) will be submitting to the Nova Scotia Department of Energy, a proposal to construct and operate the Second Phase of the Dalhousie Mountain Wind Farm (Dalhousie), known as Clydesdale Ridge Wind Farm (Clydesdale). The proposal is for a 47.04 MW wind farm located from Mount Thom to the Clydesdale Ridge in Pictou and Colchester Counties, Nova Scotia. The turbines that will be used are GE 1.68 MW 82.5 m turbines. These turbines have a hub height of 80 meters with a rotor diameter of 82.5 meters. The total height of the turbine with the blade in vertical position is 121.25 m.

Approximately 22 km of access roads are proposed, using existing roads where possible. The new build roads total approximately 4.5 km, meaning 75% of the roads proposed for the Project are existing. They will require some upgrades to allow for delivery of equipment and proper ground water control. The power-line corridor for transferring the power from the turbines to the transmission grid will run along the ditches of the access roads. The existing substation currently in use for Dalhousie has been built with Clydesdale in mind, and has the capacity for 50 more MW.

A pre-construction avian report, as required for the provincial Environmental Assessment for Clydesdale was compiled using the criteria as described in Wind Turbines and Birds: A Guidance Document for Environmental Assessment, (Environment Canada 2007a).

Sources consulted included Maritime Breeding Bird Atlas, COSEWIC, and various internet sources.

This report includes spring migration, breeding, fall migration and winter surveys in and around the Clydesdale project area, as seen in Figure 1.

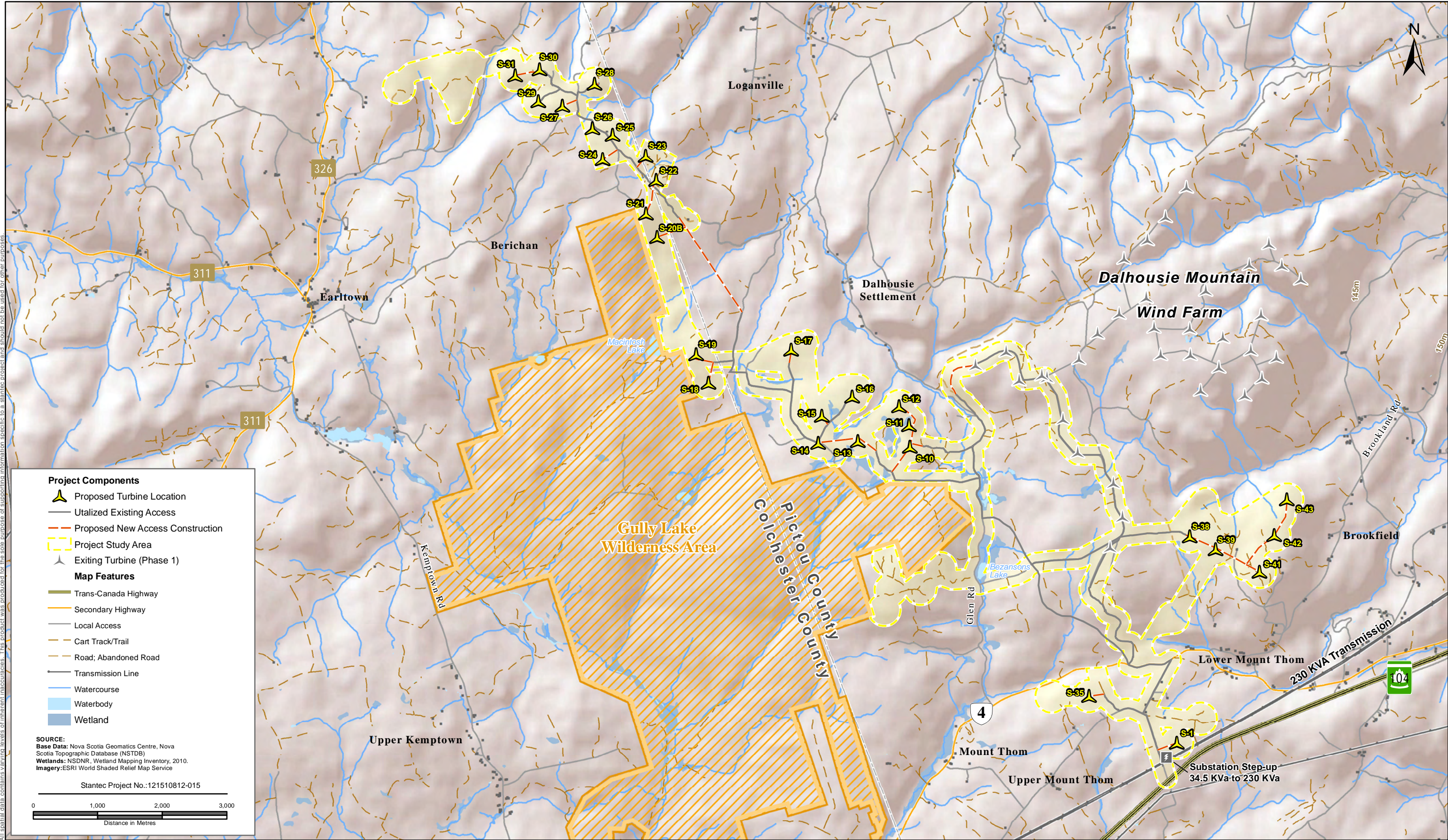
1.1 BACKGROUND

Clydesdale will be situated on woodlots with naturally occurring native species. The main feature of the landscape is regenerating woodlots. There are maple stands for syrup, blueberry fields, Christmas tree harvesting operations, and recreational camps present in the area. Old-growth forest does not occur within the project boundary. There are trails and roads throughout Clydesdale linking the various areas.

Bezansons Lake and its swampy headwaters lie in the southwestern portion of the project area of Clydesdale and drain into River John (Figure 1).

1.1.1 Important Bird Areas

The nearest Important Bird Area (NS019) is located approximately 30 km south west of the proposed wind farm. It is a staging area for various shorebirds. NS019 attracts shore birds staging for spring and fall migrations and is therefore of little concern for Clydesdale due to the distance from shore. Figure 2 shows the Important Bird Areas nearest to the project.



PREPARED BY: J. Petho	Clydesdale Ridge Wind Farm Project Current Project Layout	FIGURE NO.: 1
REVIEWED BY: C. Shupe		DATE: May 11, 2012
CLIENT: Dalhousie Mountain Wind Farm		

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Figure 2 Important Bird Area Map



2.0 METHODS

The survey methodology outlined below was considered to be appropriate for the proposed Project, given the results of pre-construction and post-construction surveys conducted in support of the associated Dalhousie Mountain Wind Farm. Consideration was given for Environment Canada's protocol guidance document (Environment Canada 2007b) during the drafting of the study protocol.

2.1 POINT COUNTS

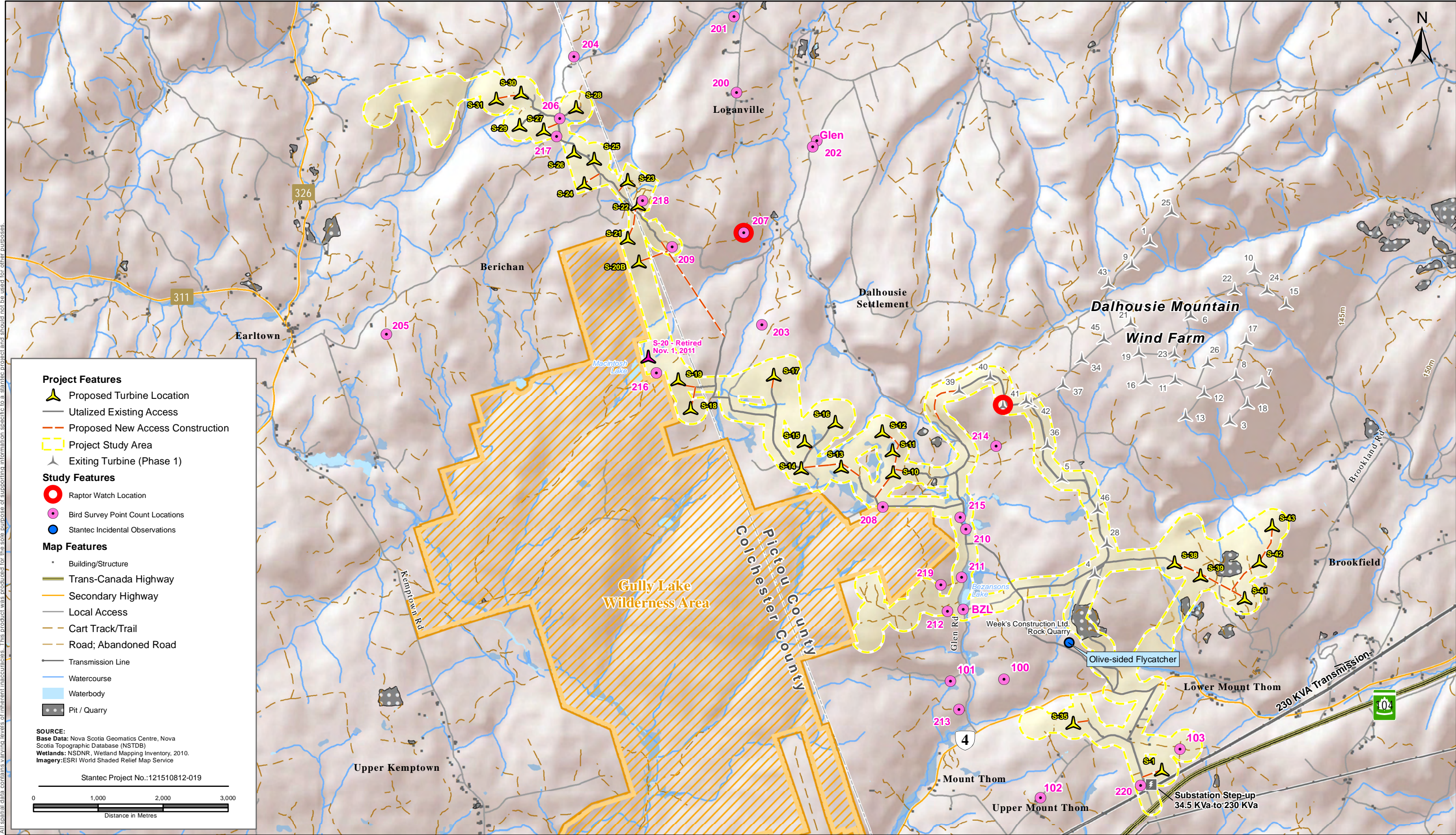
Twenty-one locations for point counts were identified in the vicinity of the Project. An attempt was made to cover all the different habitat types in the area. Particular attention was paid to the Bezansons Lake area, as breeding waterfowl (e.g., Common Mergansers and Ring-necked Ducks) were noted in this area during post-construction surveys conducted in 2010 for the Dalhousie Mountain Wind Farm. As the majority of habitats in the Clydesdale area are forest habitats, particular attention was paid to passerines. Figure 3 illustrates the point locations.

These point count locations were visited during the spring, summer, fall and winter seasons. Selected point counts were surveyed for birds for a period of 10 minutes between one half hour before sunrise to approximately 4 hours after sunrise. Surveys were not conducted during days with inclement weather (*i.e.*, damp, foggy, windy, rainy days) or high winds (more than 7 m/s or 25 km/h).

A dog usually accompanied the surveyor on the point counts. This proved effective for making the birds aware and vocal during point counts. All observations were made by one person.

Incidental observations of birds were also noted while the surveyor was in transit between point count surveys, and at other times and locations, such as at the substation. Raptors, flocks, and species of interest were noted while in transit during counts, and at other times while at the site.

Data noted during and between point counts included species (when identifiable), number identified, notes on behaviour (such as singing, calling, or in flight), and height in feet for species identified in flight. The heights at which birds were observed were converted to height categories for the purposes of data analysis, as presented in Table 1. The WAT category is meant to represent the approximate zone of the expected blade sweep of turbines.



PREPARED BY: J. Petho	Clydesdale Ridge Wind Farm Project	FIGURE NO.: 3
REVIEWED BY: C. Shupe	Bird Survey Locations	DATE: May 11, 2012
CLIENT: 		

CLYDESDALE RIDGE WIND FARM - 2011 PRE-CONSTRUCTION AVIAN REPORT

Table 1 Relative Height Categories of Birds Recorded During Surveys

Code	Description
T	Tree Level (0-10 m)
AT	Above Tree Level (10-40 m)
WAT	Well Above Tree Level (40-120m)
H	High (>120m)

2.2 SPRING MIGRATION SURVEYS

Spring migration surveys were those surveys conducted between March 24 and May 23 at selected point counts.

2.3 BREEDING BIRDS

Selected point counts were surveyed for breeding birds over three days in June between June 1 and June 28, as well as a late breeding season survey on July 25. Observations made at point counts during the breeding season were not limited to a fixed radius.

2.4 FALL MIGRATION

Fall migration surveys were those conducted between August 10 and November 16, with an aim to conduct surveys weekly; however only one day of surveys was conducted in each of October and November.

2.5 RAPTOR WATCH

Raptor watches were completed from mid-October to late-November. The locations (207, P-41) provided great panoramic views of Bezansons Lake and the valleys toward Clydesdale Ridge. Raptor watches were conducted for one hour at each location on October 15, 21 and 24, and November 7 and 29. Raptors were also noted whenever seen during any point counts or in transit.

2.6 WINTER SURVEYS

Winter surveys were conducted over nine days from early December to early February to determine the resident species in the different habitats that were accessible. Observations were recorded not only at accessible point count locations, but other areas throughout the vicinity of the proposed wind farm, including the operation & maintenance shop and substation for the Dalhousie Mountain Wind Farm.

3.0 Results and Discussion

Table 2 presents the basic habitat information and coordinates of each of the 21 point counts. These habitats are representative of the different habitats found throughout the study area, and concentrate on forest habitats which dominate the landscape.

Table 2 Point Counts

Point Number	Location	Habitat	Coordinates	
			Lat (d m s)	Long (d m s)
200	Barry Road end	Hardwood	45 38 19	63 02 57
201	Barry Road Cross	Choppings (recent cutover)	45 37 13	63 02 57
202	Glen Crossroad	Plantation (newly planted/choppings)	45 36 11	63 01 58
203	Gunshot Park	Open / mixed	45 34 39	63 02 37
204	Berichon Road Pictou County side	Field	45 36 53	63 04 51
205	Berichon Road Colchester County side	Choppings, old hardwood plantation	45 34 34	63 07 04
206	Berichon mountain	Choppings	45 36 22	63 05 01
207	Top of hill	Choppings with re-growth	45 35 25	63 02 50
208	Vanderveen marker	Old growth	45 33 08	63 01 11
209	Red cottage	Old pasture	45 35 18	63 03 41
210	Beaver dam	Stillwater	45 32 57	63 00 12
211	Bezanson cemetery	Across from lake	45 32 33	63 00 15
212	Bezanson Lake Road	Choppings	45 32 16	63 00 25
213	Dump road	Choppings	45 31 27	63 00 17
214	Vanderveen Road	Hardwood	45 33 08	63 01 12
215	Walking trail entrance	Softwood	45 33 03	63 00 16
216	Snowmobile club	Choppings	45 34 15	63 03 52
217	Clydesdale Y	Mixed	45 36 13	63 05 03
218	Cottage on hill	Open / mixed	45 35 41	63 04 02
219	Across from Bez. Lake on hill	Choppings	45 32 80	63 00 30
220	Across from substation	Shrubs	45 30 49	62 58 08

Table 3 provides a summary of weather conditions (wind speed and temperature) encountered during the migration and breed bird surveys.

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Table 3 Summary of Weather Conditions (Temperature and Wind Speed) during each Site Visit

Survey Date	Temperature (°C)	Wind speed (m/s)
March 24, 2011	-3	5
April 4, 2011	0	6
April 8, 2011	-3	5
April 18, 2011	5	7
May 16, 2011	5	7
May 23, 2011	4	6
June 17, 2011	11	3
June 23, 2011	10	2
June 28, 2011	18	6
July 25, 2011	19	6
August 10, 2011	14	5
August 12, 2011	16	6
August 16, 2011	17	7
August 23, 2011	17	7
August 30, 2011	19	3
September 12, 2011	15	9
September 20, 2011	11	5
September 22, 2011	21	6
September 26, 2011	18	7
October 12, 2011	9	4
November 16, 2011	10	4
December 1, 2011	5	5
December 2, 2011	-1	4
December 5, 2011	7	7
January 5, 2012	-6	3
January 6, 2012	-12	6
January 12, 2012	-17	4
January 30, 2012	-7	6
February 6, 2012	-10	7

The site, as expected, is generally quite windy, however winds were relatively light during the first two days of the breeding surveys.

3.1 BIRD SPECIES AND NUMBERS OBSERVED

Overall, the bird species recorded during the pre-construction monitoring period were expected for this environment, and are typical of these habitat types in mainland Nova Scotia. Species within the tables below are sorted into bird groups. A total of 1513 individual birds were documented during the four seasons of surveys, including dedicated raptor surveys. The number of species identified for this period was 70. No unexpected species were recorded.

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3.1.1 Spring Migration

Table 4 below provides the total number of each species recorded by bird group during the spring migration period. There were a total of 36 species of birds observed over 6 days of surveys at 12 of the point count locations for a total of 29 surveys (averaging 4.8 points completed per day), as well as incidental observations at other locations, such as near Bezansons Lake and Vanderveen Road. A total of 198 birds were recorded during the spring point counts, including unidentified birds.

Table 4 Bird Species Observed during Spring Migration at Clydesdale, 2011

Bird Group	Species Code	Common Name	Latin Name	Total
Waterfowl	RNDU	Ring-necked Duck	<i>Aythya collaris</i>	3
	UNID	Unidentified Species		1
Gamebird	RUGR	Ruffed Grouse	<i>Bonasa umbellus</i>	3
Raptor	BAEA	Bald Eagle	<i>Haliaeetus leucocephalus</i>	1
	RLHA	Rough-legged Hawk	<i>Buteo lagopus</i>	1
	UNID	Unidentified Species		6
Shorebird	WISN	Wilson's Snipe	<i>Gallinago delicata</i>	1
Owl	GHOW	Great Horned Owl	<i>Bubo virginianus</i>	1
Landbird	ALFL	Alder Flycatcher	<i>Empidonax alnorum</i>	1
	AMCR	American Crow	<i>Corvus brachyrhynchos</i>	24
	AMRO	American Robin	<i>Turdus migratorius</i>	50
	BAWW	Black-and-white Warbler	<i>Mniotilta varia</i>	5
	BCCH	Black-capped Chickadee	<i>Poecile atricapillus</i>	8
	BHVI	Blue-headed Vireo	<i>Vireo solitarius</i>	1
	BLBW	Blackburnian Warbler	<i>Dendroica fusca</i>	1
	BLJA	Blue Jay	<i>Cyanocitta cristata</i>	6
	COGR	Common Grackle	<i>Quiscalus quiscula</i>	3
	CORA	Common Raven	<i>Corvus corax</i>	4
	DEJU	Dark-eyed Junco	<i>Junco hyemalis</i>	12
	EUST	European Starling	<i>Sturnus vulgaris</i>	3
	HAWO	Hairy Woodpecker	<i>Picoides villosus</i>	4
	HETH	Hermit Thrush	<i>Catharus guttatus</i>	2
	MODO	Mourning Dove	<i>Zenaida macroura</i>	2
	NOFL	Northern Flicker	<i>Colaptes auratus</i>	3
	NOSH	Northern Shrike		1
	OVEN	Ovenbird	<i>Seiurus aurocapilla</i>	2

CLYDESDALE RIDGE WIND FARM - 2011 PRE-CONSTRUCTION AVIAN REPORT

Table 4 Bird Species Observed during Spring Migration at Clydesdale, 2011

Bird Group	Species Code	Common Name	Latin Name	Total
Landbird	PIWO	Pileated Woodpecker	<i>Dryocopus pileatus</i>	5
	REVI	Red-eyed Vireo	<i>Vireo olivaceus</i>	3
	RWBL	Red-winged Blackbird	<i>Agelaius phoeniceus</i>	3
	SOSP	Song Sparrow	<i>Melospiza melodia</i>	5
	SPGR	Spruce Grouse	<i>Falcapennis canadensis</i>	1
	UNID	Unidentified Species		10
	WOTH	Wood Thrush	<i>Hylocichla mustelina</i>	1
	WTSP	White-throated Sparrow	<i>Zonotrichia albicollis</i>	11
	YRWA	Yellow-rumped Warbler	<i>Dendroica coronata</i>	1
	YWAR	Yellow Warbler	<i>Dendroica petechia</i>	2
Grand Total				191

3.1.2 Breeding Birds

There were 42 species recorded during the point count surveys conducted over three days in June, with 272 birds counted, including unidentified birds. Over the three days, 14 10-minute surveys were conducted at 10 different point count locations, plus an additional survey at the Bezanson Cemetery. The late breeding season survey conducted at five point count locations in July only added one new species (Eastern Kingbird), recorded at point count 209, located in old pasture habitat. The bird may have been an early fall migrant, as it was not detected at the previous 2 surveys conducted at the site in June. Table 5 list the species observed during the breeding bird season, and the total number of each recorded.

Due to the limited amount of data from the Breeding Bird survey in 2011, RMSenergy will conduct a full Breeding Bird survey this season (2012). The results of this will be submitted to NSE and CWS upon completion as an addendum to the EA for Clydesdale Ridge Wind Farm.

Table 5 Bird Species Observed during Breeding Bird Surveys at Clydesdale, 2011

Bird Group	Species Code	Common Name	Latin Name	Total
Gamebirds	RUGR	Ruffed Grouse	<i>Bonasa umbellus</i>	3
Raptors	NOHA	Northern Harrier	<i>Circus cyaneus</i>	3
	RTHA	Red-tailed Hawk	<i>Buteo jamaicensis</i>	3
Landbirds	ALFL	Alder Flycatcher	<i>Empidonax alnorum</i>	5
	AMCR	American Crow	<i>Corvus brachyrhynchos</i>	7
	AMGO	American Goldfinch	<i>Carduelis tristis</i>	27

CLYDESDALE RIDGE WIND FARM - 2011 PRE-CONSTRUCTION AVIAN REPORT

Table 5 Bird Species Observed during Breeding Bird Surveys at Clydesdale, 2011

Bird Group	Species Code	Common Name	Latin Name	Total
Landbirds	AMRO	American Robin	<i>Turdus migratorius</i>	36
	BAWW	Black-and-white Warbler	<i>Mniotilta varia</i>	4
	BCCH	Black-capped Chickadee	<i>Poecile atricapillus</i>	4
	BEKI	Belted Kingfisher	<i>Ceryle alcyon</i>	2
	BHVI	Blue-headed Vireo	<i>Vireo solitarius</i>	2
	BLJA	Blue Jay	<i>Cyanocitta cristata</i>	6
	BTNW	Black-throated Green Warbler	<i>Dendroica virens</i>	1
	CEDW	Cedar Waxwing	<i>Bombycilla cedrorum</i>	9
	CHSP	Chipping Sparrow	<i>Spizella passerina</i>	2
	COGR	Common Grackle	<i>Quiscalus quiscula</i>	2
	CORA	Common Raven	<i>Corvus corax</i>	1
	COYE	Common Yellowthroat	<i>Geothlypis trichas</i>	6
	DEJU	Dark-eyed Junco	<i>Junco hyemalis</i>	14
	EAKI	Eastern Kingbird	<i>Tyrannus tyrannus</i>	1
	EAPH	Eastern Phoebe	<i>Sayornis phoebe</i>	5
	EAWP	Eastern Wood-Pewee	<i>Contopus virens</i>	5
	EUST	European Starling	<i>Sturnus vulgaris</i>	1
	HAWO	Hairy Woodpecker	<i>Picoides villosus</i>	2
	HETH	Hermit Thrush	<i>Catharus guttatus</i>	4
	LISP	Lincoln's Sparrow	<i>Melospiza lincolnii</i>	1
	MAWA	Magnolia Warbler	<i>Dendroica magnolia</i>	1
	NOFL	Northern Flicker	<i>Colaptes auratus</i>	9
	OVEN	Ovenbird	<i>Seiurus aurocapilla</i>	5
	PIWO	Pileated Woodpecker	<i>Dryocopus pileatus</i>	3
	RCKI	Ruby-crowned Kinglet	<i>Regulus calendula</i>	4
	REVI	Red-eyed Vireo	<i>Vireo olivaceus</i>	5
	RTHU	Ruby-throated Hummingbird	<i>Archilochus colubris</i>	2
	RWBL	Red-winged Blackbird	<i>Agelaius phoeniceus</i>	4
	SOSP	Song Sparrow	<i>Melospiza melodia</i>	8
	SWSP	Swamp Sparrow	<i>Melospiza georgiana</i>	1
	TRES	Tree Swallow	<i>Tachycineta bicolor</i>	3
	WOTH	Wood Thrush	<i>Hylocichla mustelina</i>	2
	WTSP	White-throated Sparrow	<i>Zonotrichia albicollis</i>	19

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Table 5 Bird Species Observed during Breeding Bird Surveys at Clydesdale, 2011

Bird Group	Species Code	Common Name	Latin Name	Total
Landbirds	YRWA	Yellow-rumped Warbler	<i>Dendroica coronata</i>	5
	YWAR	Yellow Warbler	<i>Dendroica petechia</i>	1
Grand Total				228

3.1.3 Fall Migration

Table 6 below provides the total number of each species recorded by bird group during the fall migration period. There were a total of 54 species of birds observed during fall migration surveys, conducted over 11 days between August 10 and November 20, with a total of 63 10-minute surveys conducted at 19 of the point counts plus two additional locations. Including unidentified birds, a total of 942 birds were recorded, with a single flock of 300 Common Grackles, and the unidentified birds making up 50% of the individuals recorded.

Table 6 Bird Species Observed during Fall Migration at Clydesdale, 2011

Bird Group	Species Code	Common Name	Latin Name	Total
Waterfowl	ABDU	American Black Duck	<i>Anas rubripes</i>	6
	CAGO	Canada Goose	<i>Branta canadensis</i>	12
	UNID	Unidentified Species		4
Waterbirds	GBHE	Great Blue Heron	<i>Ardea herodias</i>	1
	HERG	Herring Gull	<i>Larus argentatus</i>	1
Gamebirds	RUGR	Ruffed Grouse	<i>Bonasa umbellus</i>	4
	SPGR	Spruce Grouse	<i>Falcapennis canadensis</i>	2
Raptors	AMKE	American Kestrel	<i>Falco sparverius</i>	3
	BAEA	Bald Eagle	<i>Haliaeetus leucocephalus</i>	1
	BWHA	Broad-winged Hawk	<i>Buteo platypterus</i>	2
	NOHA	Northern Harrier	<i>Circus cyaneus</i>	1
	RTHA	Red-tailed Hawk	<i>Buteo jamaicensis</i>	10
Landbirds	ALFL	Alder Flycatcher	<i>Empidonax alnorum</i>	1
	AMCR	American Crow	<i>Corvus brachyrhynchos</i>	27
	AMGO	American Goldfinch	<i>Carduelis tristis</i>	40
	AMRE	American Redstart	<i>Setophaga ruticilla</i>	2
	AMRO	American Robin	<i>Turdus migratorius</i>	83

CLYDESDALE RIDGE WIND FARM - 2011 PRE-CONSTRUCTION AVIAN REPORT

Table 6 Bird Species Observed during Fall Migration at Clydesdale, 2011

Bird Group	Species Code	Common Name	Latin Name	Total
Landbirds	BAWW	Black-and-white Warbler	<i>Mniotilta varia</i>	2
	BCCH	Black-capped Chickadee	<i>Poecile atricapillus</i>	37
	BEKI	Belted Kingfisher	<i>Ceryle alcyon</i>	1
	BHVI	Blue-headed Vireo	<i>Vireo solitarius</i>	2
	BLJA	Blue Jay	<i>Cyanocitta cristata</i>	35
	BOCH	Boreal Chickadee	<i>Poecile hudsonica</i>	2
	BTNW	Black-throated Green Warbler	<i>Dendroica virens</i>	2
	CAWA	Canada Warbler	<i>Wilsonia canadensis</i>	1
	CEDW	Cedar Waxwing	<i>Bombycilla cedrorum</i>	40
	COGR	Common Grackle	<i>Quiscalus quiscula</i>	300
	CORA	Common Raven	<i>Corvus corax</i>	12
	COYE	Common Yellowthroat	<i>Geothlypis trichas</i>	5
	DEJU	Dark-eyed Junco	<i>Junco hyemalis</i>	7
	EAPH	Eastern Phoebe	<i>Sayornis phoebe</i>	4
	EUST	European Starling	<i>Sturnus vulgaris</i>	4
	EVGR	Evening Grosbeak	<i>Coccothraustes vespertinus</i>	7
	EWPE	Eastern Wood-Pewee	<i>Contopus virens</i>	10
	GRAJ	Gray Jay	<i>Perisoreus canadensis</i>	4
	HAWO	Hairy Woodpecker	<i>Picoides villosus</i>	5
	HETH	Hermit Thrush	<i>Catharus guttatus</i>	3
	LEFL	Least Flycatcher	<i>Empidonax minimus</i>	5
	LISP	Lincoln's Sparrow	<i>Melospiza lincolni</i>	3
	MAWA	Magnolia Warbler	<i>Dendroica magnolia</i>	7
	MODO	Mourning Dove	<i>Zenaida macroura</i>	2
	NOFL	Northern Flicker	<i>Colaptes auratus</i>	26
	NOPA	Northern Parula	<i>Parula americana</i>	2
	PISI	Pine Siskin	<i>Carduelis pinus</i>	1
	PIWO	Pileated Woodpecker	<i>Dryocopus pileatus</i>	6
	PUFI	Purple Finch	<i>Carpodacus purpureus</i>	2
	RBGU	Ring-billed Gull	<i>Larus delawarensis</i>	1
	RBNU	Red-breasted Nuthatch	<i>Sitta canadensis</i>	3
	REVI	Red-eyed Vireo	<i>Vireo olivaceus</i>	8
	RTHU	Ruby-throated Hummingbird	<i>Archilochus colubris</i>	6

CLYDESDALE RIDGE WIND FARM - 2011 PRE-CONSTRUCTION AVIAN REPORT

Table 6 Bird Species Observed during Fall Migration at Clydesdale, 2011

Bird Group	Species Code	Common Name	Latin Name	Total
Landbirds	SAVS	Savannah Sparrow	<i>Passerculus sandwichensis</i>	1
	SOSP	Song Sparrow	<i>Melospiza melodia</i>	6
	UNID	Unidentified Species		5
	WTSP	White-throated Sparrow	<i>Zonotrichia albicollis</i>	3
	YRWA	Yellow-rumped Warbler	<i>Dendroica coronata</i>	6
Undetermined	UNID	Unidentified Species		166
Grand Total				942

3.1.4 Winter Surveys

Winter surveys revealed few resident species using the Study Area, with only 11 species identified, as well as some unidentified gulls recorded in late January. While birds were recorded over 9 days during the winter period between December 1, 2011 and February 6, 2012, during three of these days, only a single bird was recorded. Many point counts surveyed in January yielded no birds. Table 7 below provides the total number of each species recorded by bird group during the winter survey period.

Table 7 Bird Species Observed during Winter Surveys at Clydesdale, 2011/2012

Bird Group	Species Code	Common Name	Latin Name	Total
Gamebirds	RIPH	Ring-necked Pheasant	<i>Phasianus colchicus</i>	1
	RUGR	Ruffed Grouse	<i>Bonasa umbellus</i>	2
Waterbirds	UNID	Unidentified gulls		25
Raptors	BAEA	Bald Eagle	<i>Haliaeetus leucocephalus</i>	5
	UNID	Unidentified raptor		1
Landbirds	AMCR	American Crow	<i>Corvus brachyrhynchos</i>	18
	AMGO	American Goldfinch	<i>Carduelis tristis</i>	1
	BCCH	Black-capped Chickadee	<i>Poecile atricapillus</i>	20
	BLJA	Blue Jay	<i>Cyanocitta cristata</i>	5
	CORA	Common Raven	<i>Corvus corax</i>	4
	GRAJ	Gray Jay	<i>Perisoreus canadensis</i>	2
	PIWO	Pileated Woodpecker	<i>Dryocopus pileatus</i>	3
	SNBU	Snow Bunting	<i>Plectrophenax nivalis</i>	51
Grand Total				138

CLYDESDALE RIDGE WIND FARM - 2011 PRE-CONSTRUCTION AVIAN REPORT

Winter birds on Clydesdale consisted of expected species of Common Raven, American Crow, Pileated Woodpecker, Black-capped Chickadees and Blue Jays, with low numbers of others including American Goldfinch and Ruffed Grouse. Most observations were of birds in small numbers with the exception of a flock of 15 black capped chickadees seen in flight over forest. Incidental observations included 25 of unknown gulls in three flocks observed following each other southward from the substation, all on the same date. They were observed at about 150 m circling toward the south. Snow buntings frequent the farm located 900 m southwest of the substation; they are resident throughout the winter in some open lands (e.g., farms and pits). A flock of approximately 70 Snow Bunting has also been seen during the winter at the nearby Week's Construction Ltd. rock quarry, located 2 km north of the substation, along an existing access road. Bald Eagles have been observed hunting in the substation area. As these are observed frequently they are likely winter residents.

A total of 43 point counts were carried out during January with a total of 41 individuals of eight species being observed. At 24 of the point counts conducted in January, no birds were observed.

3.1.5 Raptor Watches

While raptors were identified during spring, breeding, fall and winter surveys, dedicated 1-hour raptor watch surveys conducted in mid-October to late-November resulted in relatively few raptors observed, and few likely migrating through the site. Table 8 lists the observations in late September and during the five days of raptor watch surveys in October and November, including observations at other times during those days. No raptors were observed during raptor watches at site 207, and during four of the five 1-hour surveys at P-41. In fact only a single Bald Eagle was observed during the raptor watch at P-41 on November 7.

Table 8 Bird Species Observed during Raptor Watches and In Transit at Clydesdale, 2011

Date	Raptor	Count	Location	Height	Action
27-Sep*	Red-tailed Hawk*	2	South west P-04	200 Feet	Circling
	Unidentified raptor*	1	substation	< 500 meters	Migrating Southwards
	Unidentified raptor*	1	substation	< 500 meters	Migrating Southwards
	Broad-winged Hawk*	1	O&M shop	12 feet	Hunting over field
15-Oct	Bald Eagle*	1	O&M shop	200 feet	Hunting
	American Kestrel*	1	Between P-40-41	seen for last 2 years	Hunting
21-Oct	Bald Eagle*	2	South west P-41	700 feet	Circling
24-Oct	Bald Eagle*	1	South west P-41	50 feet	Hunting
7-Nov	Bald Eagle*	1 mature	P-42	200, increasing to to 800 feet over Dalhousie wind farm	Hunting / avoiding turbines
	Bald Eagle	1 juvenile	P-41	hunting	200 feet

CLYDESDALE RIDGE WIND FARM - 2011 PRE-CONSTRUCTION AVIAN REPORT

Table 8 Bird Species Observed during Raptor Watches and In Transit at Clydesdale, 2011

Date	Raptor	Count	Location	Height	Action
	Bald Eagle*	1 juvenile	O&M shop	800 feet	Migrating
29-Nov	Rough-legged Hawk*	1	west P-41	200-300 feet	Hunting

* Incidental observations, not part of the 1-hr raptor watch counts.

The most commonly observed raptors on the watch days were Bald Eagles and a pair of Red-tailed Hawks. These individuals have inhabited the Dalhousie area for at least the last 3 years (author's personal observation). Juvenile Bald Eagles observed suggest successful breeding within the general area, but no nests have been observed in the Study Area. Bald Eagles have been observed hunting around the project area during most of the year, suggesting a resident population. One of the Bald Eagle observations involved an individual heading north east hunting toward Dalhousie at turbine level. When it came close to turbine P-41, the eagle increased altitude to about 800 feet (well above turbine height) and crossed the wind farm. It then returned to its original altitude of 200 feet and continued hunting.

The raptor watch locations covered the north western part of the existing Dalhousie farm and the south-eastern side of Clydesdale. While few raptors were noted in higher elevations during the year, a total of ten raptors were spotted during the raptor watch; the majority of the raptors being either mature (5) or immature (2) Bald Eagles.

A single American Kestrel has been observed between turbines P-40 and P-41 the last couple years (author's personal observation). Bald Eagles were seen regularly in the substation area through the winter of 2011-2012.

3.2 BEHAVIOUR DATA (MIGRATION)

Due to the differences in potential sensitivity of different bird groups (Kingsley and Whittam 2004), the data on migration were summarized according to seven bird groups: waterfowl (including ducks geese and swans), waterbirds (including herons, gulls and cormorants), shorebirds (including plovers and sandpipers) raptors (including hawks, falcons and eagles) owls, gamebirds (including grouse), and landbirds, the largest group. Although it can be difficult to distinguish migrating birds and local birds, undoubtedly data on migrating birds were collected during surveys, as indicated by observations of bird species that have not been recorded as breeding or wintering in the area, and the timing of migration surveys. Birds observed within 10 m of the ground were considered to be at Tree Height (T), those flying from 10-40 m of the ground were considered to be Above Tree Height (AT), those flying from 40-120 m were considered to be Well Above Tree Height (WAT), and those birds flying above 120 m were described as High (H).

3.2.1 Spring Migration

Table 9 summarizes the overall height of activity of the bird groups observed during spring surveys. Landbirds were by far the most prominent bird group recorded during the monitoring

CLYDESDALE RIDGE WIND FARM - 2011 PRE-CONSTRUCTION AVIAN REPORT

period. American Robin was the most abundant landbird species recorded, with 50 individuals. Most of these were observed in small groups of 5 or less, with a few larger groups of up to 8 individuals. These birds were generally foraging at T height. No landbirds were observed at WAT height, or at heights greater than 100 m above the ground (*i.e.* H flight height). Of the 174 landbirds observed, 90% were active at or below 10m from the ground. American Crow was the second most numerous bird counted. Of the 24 individuals counted, 10 were recorded at AT flight height, the remainder were within 10m of the ground. Dark-eyed Junco was the third most numerous species counted, with all but one of the 12 individuals counted observed at 10m or less from the ground. All individuals were observed singly, foraging near the ground.

Table 9 Overall Activity by Height of the Bird Groups Observed during the Spring Monitoring Period.

Bird Group	Height ¹				N ²
	T	AT	WAT	H	
Gamebird	100%(100%)	0%(0%)	0%(0%)	0%(0%)	3(3)
Landbird	93%(90%)	7%(10%)	0%(0%)	0%(0%)	143(174)
Owl	100%(100%)	0%(0%)	0%(0%)	0%(0%)	1(1)
Raptor	33%(38%)	50%(50%)	17%(13%)	0%(0%)	6(8)
Shorebird	100%(100%)	0%(0%)	0%(0%)	0%(0%)	1(1)
Waterfowl	100%(100%)	0%(0%)	0%(0%)	0%(0%)	2(4)
Unidentified	83%(71%)	17%(29%)	0%(0%)	0%(0%)	6(7)
Grand Total	147(174)	14(23)	1(1)	0(0)	162(198)
Notes: ¹ Data presented are percentage of observations (percentage of individual birds) observed in each area.					
² Total number of observations (total number of individual birds).					

Other bird groups were seen in small numbers, and little can be interpreted from apparent differences in flight height. For example, although 13% of raptors were noted flying at WAT height, this actually represents a single bird out of a total of 8 observed during the migration monitoring program.

Flocks of waterfowl flying high above the ground were notably absent, with only 4 individuals of a single identified species (Ring-necked Duck) being observed during the migration monitoring period.

All owls, shorebirds, and gamebirds were observed at T height.

3.2.2 Fall Migration

Table 10 summarizes the overall height of activity of the bird groups observed during fall surveys. Landbirds were by far the most prominent bird group recorded during the fall monitoring period. Common Grackle was the most abundant landbird species recorded, at 300 individuals. These birds were all observed in one large group. All were flying at AT height. A very small proportion (1%) of landbirds was observed at the WAT height, and no landbirds were observed at H flight height. Of the 729 landbirds observed, 51% were active at or below 10 m

CLYDESDALE RIDGE WIND FARM - 2011 PRE-CONSTRUCTION AVIAN REPORT

from the ground. American Robin was the second most numerous bird species observed. Of the 83 individuals counted, only one large group of 25 was recorded greater than 10 m above the ground. American Goldfinch and Cedar Waxwing were the third most numerous species counted, with 40 individuals of each species being observed. Eleven of the American Goldfinch were observed flying at AT height, with the remainder of the birds being observed at or below 10 m from the ground.

Table 10 Overall Activity by Height of the Bird Groups Observed during the Fall Monitoring Period.

Bird Group	Height ¹				N ²
	T	AT	WAT	H	
Gamebirds	100%(100%)	0%(0%)	0%(0%)	0%(0%)	5(6)
Landbirds	91%(51%)	8%(48%)	1%(1%)	0%(0%)	270(729)
Raptors	67%(71%)	33%(29%)	0%(0%)	0%(0%)	15(17)
Waterbirds	0%(0%)	100%(100%)	0%(0%)	0%(0%)	2(2)
Waterfowl	50%(32%)	25%(18%)	25%(50%)	0%(0%)	4(22)
Unidentified	79%(80%)	21%(19%)	0%(0%)	0%(0%)	53(166)
Grand Total	305(533)	41(395)	3(14)	0(0)	349(942)
Notes: ¹ Data presented are percentage of observations (percentage of individual birds) observed in each area.					
² Total number of observations (total number of individual birds).					

In the fall season, various flocks were observed in the low lying areas surrounding the Bezansons Lake, including one flock of 11 Canada Geese, and the single flock of 300 Common Grackles noted above.

3.3 SPECIES AT RISK

A pair of Olive-sided Flycatchers (listed as Threatened on Schedule 1 of the *Species at Risk Act*) was spotted by two biologists approximately 200 m southwest of the Week's rock quarry on August 12, 2011. The flycatcher location was visited for observation on August 12, 15, 17, 18, 19, 20, 24, and 26. A possible nesting site was observed with two non-harvested hardwood islands with coniferous undergrowth, which is conducive to nesting. August 17 was the last day of observing the pair. A follow-up in spring will verify if they return to nest. The presence of the pair is a good sign that Olive-sided Flycatchers are not adversely affected by nearby disturbances, as the nest site is close to the Week's rock quarry.

Canada Warbler, also listed as Threatened on Schedule 1 of the *Species at Risk Act*, was only recorded in late August at point count 209, an old-field site unlikely to provide breeding habitat for this species.

4.0 Summary

Four seasons have been surveyed for the Pre-construction Avian Monitoring for Clydesdale. Inclement weather during a four week period from June 28 to July 25 left a gap for the summer breeding data. Monitoring, including supplemental breeding bird surveys, will continue into the summer 2012 to ensure the Clydesdale Avian Study is thorough and meets the requirements and recommendations of the Canadian Wildlife Service of Environment Canada.

Personal interviews were conducted with residents in the area to gather knowledge of and core migrations that affect the area. There are no migration staging areas close to the proposed wind farm as there are no shorelines or agricultural areas close. No large flocks of migrating birds flying over the proposed wind farm area have been reported by any Dalhousie wind farm staff.

There were no large flocks of waterfowl observed flying over the project area. A flock of approximately 300 Common Grackles migrating in the fall were seen on August 23 near the beaver dam, near Bezansons Lake. No other large flocks of migrating birds were observed.

No substantial numbers of migrating birds were observed in the Study Area suggesting that it is not an important migration route for avian species.

5.0 References

- Environment Canada. (2007a). Wind Turbines and Birds A Guidance Document for Environmental Assessment. http://www.cws-scf.ec.gc.ca/publications/eval/index_e.cfm
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