



Keeyask Infrastructure Project

Terrestrial and Aquatic Monitoring Plan

Avian Monitoring

Annual Report 2012-2013



KEYYASK INFRASTRUCTURE PROJECT

TERRESTRIAL AND AQUATIC MONITORING PLAN

Avian Monitoring: Annual Report 2012 - 2013

Report for

MANITOBA CONSERVATION AND WATER STEWARDSHIP

Prepared on Behalf of the
Keeyask Hydropower Limited Partnership

Prepared by
Stantec Consultants Inc.

December 2013

TECHNICAL SUMMARY

This report discusses results from the first year of construction-related bird monitoring for the Keeyask Infrastructure Project (the Project or KIP). The Project includes the construction of a start-up camp, 25 km all-weather road, and infrastructure for a main camp.

As part of the KIP licensing conditions (Environment Act Licence No. 2952R), the Keeyask Hydropower Limited Partnership is conducting terrestrial effects monitoring during the KIP construction. This annual report covers the period beginning at the start of construction, January 2012, through to March 31, 2013. Avian monitoring in 2012 included breeding-bird surveys and nocturnal owl surveys located within and adjacent to construction areas as well as deployment of recording units. Areas within the Local Study Area (LSA) were surveyed to monitor impacts from construction of the Project. Areas within the Regional Study Area (RSA) were also surveyed as a reference to assess bird communities in non-impacted areas. Data collected was used to verify anticipated construction-related effects on birds.

Results from the monitoring period indicated the presence of at least 54 species of birds. Three of these are considered *at risk* under the *Species at Risk Act* (SARA) and one is listed as a species of *special concern* under COSEWIC: rusty blackbird (*Euphagus carolinus*) and olive-sided flycatcher (*Contopus cooperi*) are both species of *special concern* according to COSEWIC and listed on Schedule 1 of SARA; common nighthawk (*Chordeiles minor*) is *threatened* according to COSEWIC, is listed on Schedule 1 of SARA, and is a *threatened species* under MESA; and horned grebe (*Podiceps auritus*) is a species of *special concern* by COSEWIC.

The number of bird species (species diversity) between the LSA and the RSA sites were similar. Some differences in composition were noted between the RSA and the LSA sites. Several species with low densities were noted at either LSA or RSA sites. Higher densities of fox sparrow were found at RSA sites and higher densities of dark-eyed junco and ruby-crowned kinglet were found at a LSA site. All of these results are consistent with natural variability and known habitat preferences of birds in Manitoba's boreal ecosystem.

Overall, average bird densities observed in the RSA were approximately 4.6 birds/ha, with the highest densities being observed in tall shrub vegetation communities, followed by low vegetation and black spruce pure and black spruce mixture communities. A similar density of birds was noted in all vegetation community type RSA sites sampled in 2012, as compared with the construction-LSA sites in the same year. The LSA sites included those adjacent to active borrow pits and the KIP road ROW development. An analysis of distance from disturbance for sites within the LSA showed lower density and diversity of birds at sites closest to the active construction areas, suggesting that birds may be avoiding areas with construction noise.

Nocturnal owl surveys revealed the presence of 13 nocturnal owls consisting of three species: boreal owl, great horned owl and great gray owl. Seven of the 13 owls were detected in areas along or adjacent to (<1 km) the KIP road. Of note was a cluster of owls located in the vicinity of a recently cleared borrow area. Environmental Assessment predictions anticipated an increase in owl occurrence in recently cleared areas, as many species of owls hunt along forest openings where prey (e.g., mice, voles) are more easily detected.

The first year of construction monitoring has contributed to information on changes to bird density and diversity in the vegetated areas within the KIP LSA and Project footprint areas. Future years of the bird monitoring program will help to gain a greater understanding of the impact of KIP construction on the local bird community.

ACKNOWLEDGEMENTS

Stantec Consultants Inc. would like to thank Manitoba Hydro for their support throughout these studies, and the Keeyask Cree Nations partners for permitting these studies within their resource management areas and areas of community interest. We wish to thank Leo Kirkness and Kenneth Ouskun of Tataskweyak Cree Nation for their assistance during the 2012 field studies. We also wish to express our gratitude to the other KIP consulting teams that assisted in providing input and logistical support for this project. We appreciate the efforts of Mr. Ron Bretecher, Ms. Mary Lang and Ms. Shari Fournier for their organizational assistance.

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1.0 INTRODUCTION

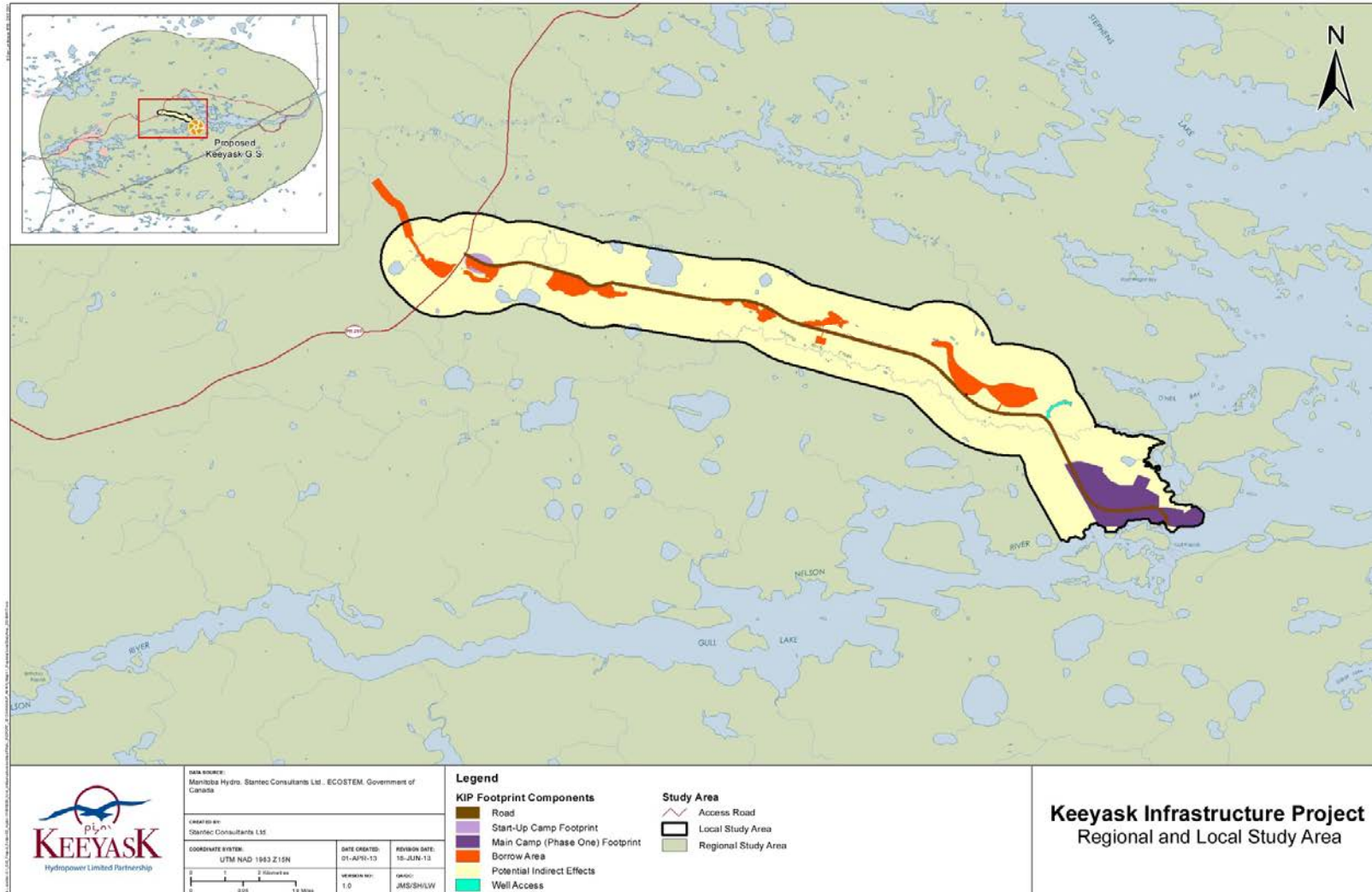
1.1 OVERVIEW

The Keeyask Hydropower Limited Partnership is constructing the Keeyask Infrastructure Project (the Project or KIP). The Project is located approximately 40 km southwest of Gillam, extending between Provincial Road (PR) 280 and Gull Rapids on the Nelson River (Map 1-1). The Project includes a start-up camp and associated infrastructure, a 25 km all-weather access road and the first phase of a main camp.

This annual report covers the period beginning at the start of construction, January 2012, through to March 31, 2013.

As described in the Keeyask Infrastructure Project Environmental Assessment Report (2009), most of The Project's anticipated effects are expected to occur within the Local Study Area (LSA) (Map 1-1). Studies were focused within this area although some Regional Study Area (RSA) or control sites were also monitored (Map 1-1). Specific Project effects predictions for birds include:

- Removal of bird habitat due to clearing for Project infrastructure resulting in minimal, local loss of bird habitat;
- Bird avoidance of Project areas due to clearing, blasting and other construction activities, resulting in avoidance of some local areas by some birds; and
- Increased bird mortality due to vehicle collisions along the KIP road resulting in a small increase in bird mortality.



Map 1-1

Map 1-1: Study Areas for Keyask Infrastructure Project

Construction of the road right-of-way was initiated in January 2012. Spring 2012 marked the first year of construction monitoring activities for bird communities inhabiting the area. Field studies were conducted during the sensitive breeding periods for owls (April) and breeding birds (June). At the time of surveys, road development, and borrow exploration and extraction was ongoing. This report documents the avian monitoring studies conducted in 2012 and incorporates information from the existing baseline datasets developed for the Project. Pre-clearing aerial nest surveys carried out in 2011, prior to the start of 2012 construction activities, are also included.

Photographs of representative **habitats**¹ surveyed are provided in Appendix B. Details of bird survey results and surveyed vegetation communities are provided in Appendices C and D. Appendix E outlines additional observations of wildlife recorded during surveys, and weather data recorded during 2012 surveys are provided in Appendix F.

¹ Definitions for words appearing in bold are provided in Appendix A.

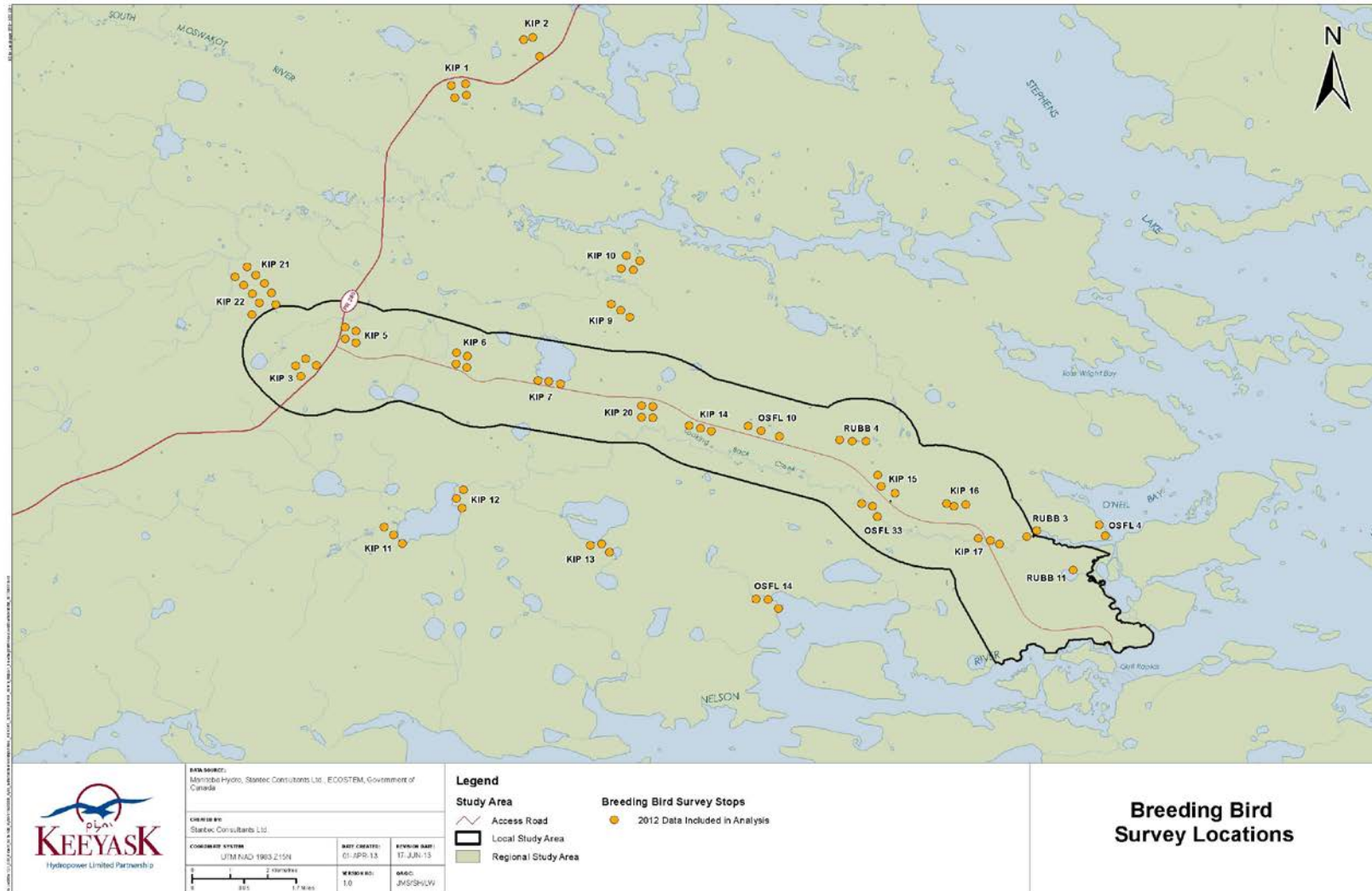
2.0 METHODS

Bird survey methods focused on gathering information on species or bird groups potentially affected by The Project. They include early morning point count surveys for diurnal species (e.g., songbirds), evening point count surveys for nocturnally active species (e.g., owls known to breed within the Region) and automated recording units for recording nocturnally active birds in remote areas. Together these methods aimed at gathering information on species at risk known or expected to breed within the area, resident owls and songbirds.

2.1 BREEDING-BIRD SURVEYS

Between June 25 and July 2, 2012, construction phase breeding-bird monitoring surveys were conducted at sites previously surveyed in 2004, 2005, 2010 and 2011, along with additional sampling sites (selected in the field) in the vicinity of the start-up camp site, the main camp site, proposed borrow pit sites, and areas adjacent to the KIP road ROW (Map 2-1). For comparative purposes, RSA (control) sites comprised of vegetation communities similar to those located in construction areas were also sampled.

The methods for conducting breeding-bird monitoring surveys were based on the Canadian and American standard procedures for conducting population surveys using the Point Count Method (USGS 2001; Ralph *et al.* 1993; Welsh 1993) and are consistent with those followed by the Manitoba Breeding Bird Atlas (Manitoba Breeding Bird Atlas 2010). Surveys were not conducted when rain or winds greater than ~20 kph interfered with the intensity or audibility of bird songs, or when fog or rain interfered with visibility. Breeding-bird surveys occurred during the peak bird singing hours of 0500-1000 h. To ensure double counting of birds was avoided, point counts or listening stops were located at 300-m intervals along a set transect of variable length.



Map 2-1: Breeding-Bird Survey Locations 2012

Transect locations were pre-selected within major vegetation community types using previous years' survey data and vegetation data (ECOSTEM 2013) in order to permit a good evaluation of the sampling area. Breeding-bird survey transect sites were located in representative vegetation community areas; each transect was placed within the largest areas of continuous (i.e., homogenous) habitat. Where sampling did not match the interpretation of data (i.e., area had since been burned or cleared), nearby alternative transect sites were selected in the field.

At each point-count survey stop, the field team (two biologists and a First Nations assistant) allowed a minute to pass prior to proceeding with the sample period; this allowed birds to settle prior to sampling. Each sample period was 5 minutes in length (only birds recorded in the first three minutes were used in the analysis for comparison to previous years data), during which one biologist recorded the number and species of all birds heard or seen within and outside of each 75-m-radius (1.77-ha) stop or 'plot.' Birds flying over the stop were excluded from the stop density calculation if they were not considered to be using the habitat at the stop being surveyed. All additional wildlife observed during surveys was recorded as reconnaissance observations (Appendix E, Table E-1).

The survey stops were classified according to vegetation community/cover type, and categorized into thirteen broad vegetation types (ECOSTEM 2013): black spruce **mixedwood**, black spruce mixture, black spruce pure, black spruce pure/tall shrub, jack pine mixedwood, jack pine mixedwood/tall shrub, jack pine mixture, low vegetation, trembling aspen mixedwood, tall shrub, tamarack larch pure, white birch mixedwood and young regeneration (Appendix B, Photos 1-4). Data collected was utilized to determine bird density, diversity and distribution throughout the Regional Study Area. Average bird densities per hectare were calculated using the total number of birds observed within each 75-m radius stop (i.e., 1.77-ha). Standardized comparisons were made using these calculated bird densities between control (i.e., RSA) survey stops and survey stops potentially affected by construction activities. Diversity information was calculated using the average number of birds found in each broad vegetation type.

2.1.1 Recording units

Recording units were used to determine presence of species at risk, particularly those which are nocturnally active. The following species at risk, protected by federal and/or provincial legislation, are nocturnally active and have the potential to breed within terrestrial habitats potentially affected by The Project:

- common nighthawk (*Chordeiles minor*; *threatened* according to COSEWIC and listed on Schedule 1 of SARA and a *threatened* species by MESA)
- yellow rail (*Coturnicops noveboracensis*; *special concern* status by SARA [Schedule 1] and COSEWIC)

Point-count surveys during early morning hours captures the daily peak singing period for most terrestrial songbirds, including the SARA-listed rusty blackbird and olive-sided flycatcher. However, in the northern boreal forest, common nighthawk is known to be more active at dusk. Similarly, yellow rails call most often at night, usually beginning after dark. In order to gather presence/absence information from these nocturnally active species, recording units were deployed within preferred breeding habitat types of common nighthawk and yellow rail. Units were set to record between 2200h and 2400h, and also between 0500h and 0600h to capture other birds, including rusty blackbird and olive-sided flycatcher. Recordings were later evaluated to determine the presence of species at risk.

2.2 NOCTURNAL OWL SURVEYS

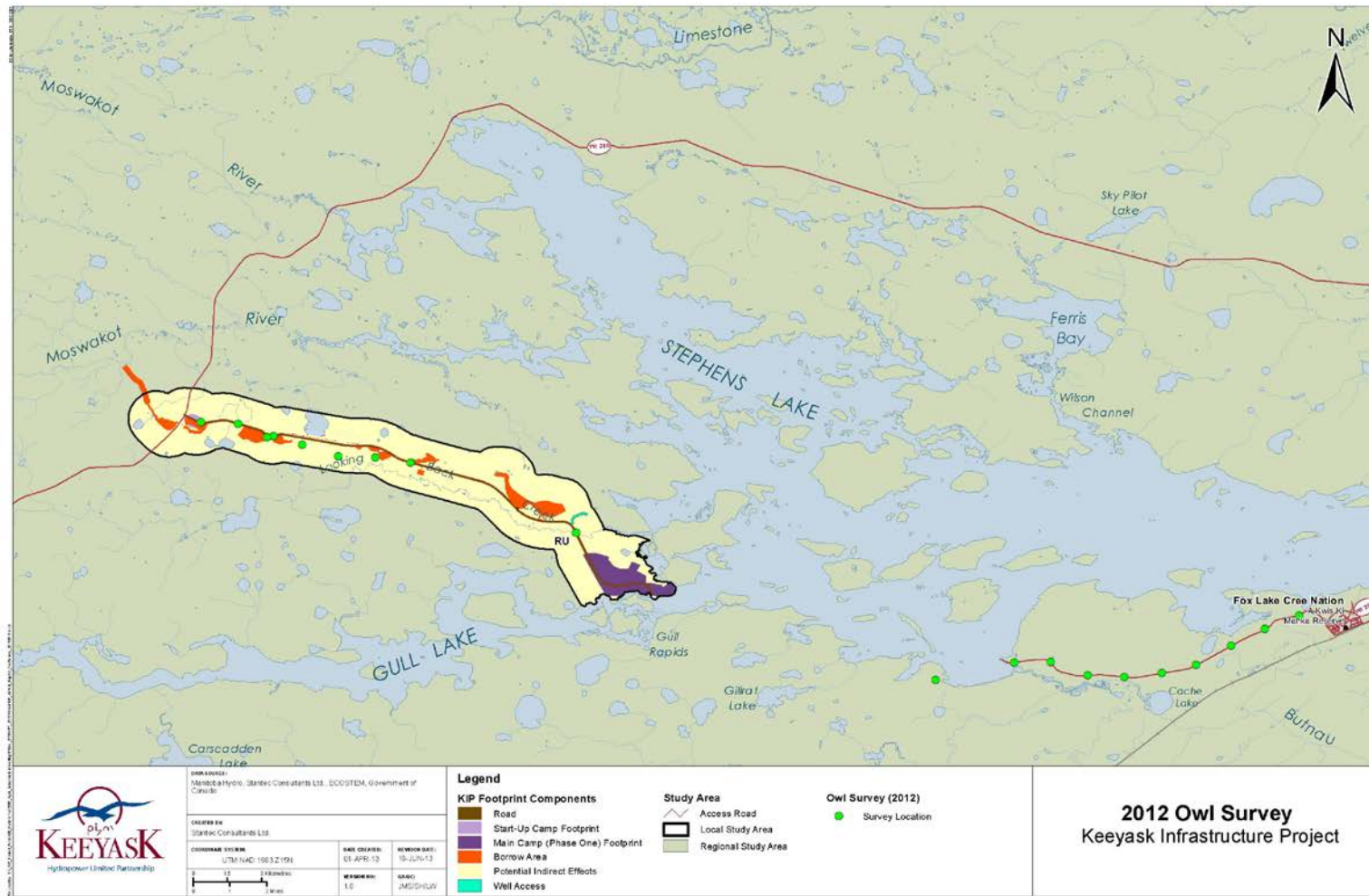
Auditory owl surveys were conducted between April 10 and 12, 2012, along the winter trail adjacent to the KIP road ROW, along Provincial Road 280 (PR280) and along the Butnau Road. At the time the surveys were conducted, most of the KIP road ROW was under construction and therefore not accessible by truck. Warm spring conditions did not permit access with snowmobile (no snow cover along trail) so surveys were limited to areas along the winter trail that could be safely accessed by truck. As a result, most of the owl survey points occurred within the first 10 km of the KIP road ROW (off PR 280). One recording unit was deployed at the Looking Back Creek crossing location via helicopter (Map 2-2).

A total of 38 survey stops were surveyed for owls within the Regional Study Area. Surveys were conducted following survey protocols used by Manitoba Conservation for their annual Manitoba Nocturnal Owl Surveys (Takats *et al.* 2001). Each survey began within a half hour of sunset and was concluded around midnight. The two-minute listening stops were located 1.6 km apart along pre-determined transects.

During each listening stop, information recorded on data sheets included:

- species (and sex where possible) of each owl heard;
- whether the call was repeated;
- direction and distance from which owls called;
- time, temperature, snow cover, cloud cover, wind speed, traffic count (number of cars) and ambient noise levels, and
- any additional wildlife seen or heard.

Data collected was utilized to determine owl densities for comparison to baseline data.



Map 2-2

Map 2-2: Nocturnal Owl Survey Points 2012

2.3 PRE-CLEARING AERIAL NEST SURVEYS

Low-level nest survey flights were conducted by helicopter along the proposed road ROW on April 14, 2011, and June 12, 2011, between 0900h and 1700h. Surveys focused on identifying the presence of highly visible treetop **raptor** and colonial bird nests (e.g., red-tailed hawk [*Buteo jamaicensis*], bald eagle [*Haliaeetus leucocephalus*], and osprey [*Pandion haliaetus*]) within the road trail and camp footprints in order to determine (if necessary) the location for potential terrestrial buffer areas during clearing activities, as outlined in Manitoba Conservation's Forest Management Guidelines For Terrestrial Buffers (2010). These surveys were carried out prior to the start of construction activities in 2012.

Surveys occurred at heights between 130 m and 200 m above ground level (a.g.l.), at speeds of approximately 60 kph. A Garmin GPS unit was used to record the UTM coordinates of all nests encountered. Nests were noted as being active (with adults and/or young present) or inactive (no birds present and no sign of nesting activity). Incidental observations of other birds active in the area were also recorded.

2.4 OTHER WILDLIFE DATA

Incidental observations such as birds heard outside of survey stops, bird nest locations and other wildlife signs were recorded when encountered during avian surveys (Appendix E, Table E-1). When a bird was seen or heard before or after a point count, or en route to another point count, it was recorded as an incidental observation. Non-avian related observations (e.g. amphibians, mammals) were recorded and passed on to other study teams.

3.0 RESULTS

3.1 BREEDING-BIRD SURVEY RESULTS

A total of 772 birds representing at least 54 species were observed during breeding-bird surveys in the Regional Study Area in 2012 (Appendix C, Table C-1). The Regional Study Area has the potential to support up to 178 species (Appendix C, Table C-2). Three species at risk were identified during breeding-bird surveys: olive-sided flycatcher, rusty blackbird and horned grebe. Although waterbirds (e.g., grebes) are not the target of early morning breeding-bird surveys, they were observed and recorded within point count survey sampling sites. One horned grebe was observed on a wetland located along the KIP road ROW (Map 3-1). Seven rusty blackbirds (detected at six survey stops) and two olive-sided flycatchers were detected during early morning point count surveys. Both species were observed using their preferred breeding habitat; rusty blackbirds were detected in areas supporting riparian habitat, while olive-sided flycatcher was detected along forest edges where riparian and/or regenerating forest habitat was prevalent.

Passerine birds accounted for 95% of the total birds observed. Other bird groups represented included woodpeckers and shorebirds (e.g., solitary sandpiper [*Tringa solitaria*]).

A total survey area of 143.4-hectares (ha), comprised of 81 stops was sampled (Map 2-1).

3.1.1 Density

Overall, about 4.6 ± 2.1 birds/ha were observed across the Regional and Local Study Area in 2012. When bird distribution among vegetation community types was considered, the highest average bird densities in 2012 were observed in tall shrub plant communities, followed by low vegetation plant communities. Jack pine mixture supported noticeably lower bird densities than any of the other vegetation community types (Table 3.1-1). Overall average bird densities for all vegetation communities surveyed in 2012 were higher than observed in 2011 (Mann-Whitney, $U = 1,142.5$, $p < 0.0001$). The average bird densities in black spruce pure, black spruce mixture, jack pine mixture and young regeneration vegetation communities were significantly higher in 2012, in comparison to 2011's baseline monitoring data (Table 3.1-2). Variation in bird

**Table 3.1-1: Average Bird Densities in the Regional Study Area
2011 and 2012**

	Number of Birds	Number of Stops	Total Surveyed Area (ha)	Average Density (birds/ha)	Number of Birds	Number of Stops	Total Surveyed Area (ha)	Average Density (birds/ha)
Vegetation Community Type ¹	2011				2012			
Black Spruce (Mixture and Pure stands)	185	44	77.9	2.4 ± 1.1	364	44	77.9	4.7 ± 1.8
Jack Pine Mixture	27	9	15.9	1.7 ± 0.7	34	7	12.4	2.7 ± 0.9
Low Vegetation	-	-	-	-	48	5	8.9	5.4 ± 1.0
Tall Shrub	-	-	-	-	69	5	8.9	7.8 ± 2.7
Young Regeneration	73	18	31.9	2.3 ± 1.6	69	10	17.7	3.9 ± 2.2
NOTE: ¹ Vegetation community types with three point-count stops or fewer are not included in this table and not utilized in habitat analysis. Low vegetation and tall shrub were sampled for species at risk in 2012.								

abundance observed between sampling years (2011 vs. 2012) is not uncommon due to the range of natural variability in wildlife populations.

Table 3.1-2: Average Bird Densities in the Regional Study Area LSA vs. RSA Sites (2011 and 2012)						
Vegetation Community Type¹	LSA Sites			RSA Sites		
	Average Density (birds/ha)			Average Density (birds/ha)		
	2011	2012	p-value³	2011²	2012	p-value³
Black Spruce (Mixture and Pure Stands)	2.1 ± 1.1	4.6 ± 1.8	<i><0.0001</i>	2.5 ± 1.1	4.7 ± 1.8	<i><0.0001</i>
Jack Pine Mixture	1.9 ± 0.6	2.9 ± 1.0	<i>0.03</i>	-	-	-
Low Vegetation	-	5.6 ± 1.1	-	-	-	-
Young Regeneration	2.3 ± 1.6	3.9 ± 2.2	<i>0.03</i>	-	4.2 ± 2.3 ²	-
Total (all Vegetation Community types)	2.0 ± 1.4	4.8 ± 2.4	<i><0.0001</i>	2.2 ± 1.2	4.4 ± 1.7	<i><0.0001</i>
NOTE:						
¹ Vegetation community types with three point count stops or fewer are not included in this table.						
² Based on the Keeyask 2001-2011 BBS dataset.						
³ Mann-Whitney U test was used to compare LSA and RSA sites between years. Significant results are italicized.						

In 2012, the density of birds inhabiting RSA sites was statistically similar to that observed in construction-LSA sites adjacent to active borrow pits and the KIP road ROW (Mann-Whitney, $U = 768$, $p = 0.772$) (Table 3.1-3). An analysis of the individual bird species densities between the RSA and LSA sites showed that fox sparrow (Mann-Whitney, $U = 302$, $p = 0.01$) was present in significantly higher densities in the RSA sites in 2012. Dark-eyed junco (Mann-Whitney, $U = 133.5$, $p = 0.024$) and ruby-crowned kinglet (Mann-Whitney, $U = 140$, $p = 0.027$) had significantly higher densities in the LSA sites in 2012.

Table 3.1-3: Average Bird Densities in LSA vs. RSA sites (2012)

Vegetation Community Type ¹	LSA Sites	RSA Sites	P-value
	Average Density (birds/ha)		
Black Spruce (Mixture and Pure Stands)	4.6 ± 1.8	4.7 ± 1.8	0.879
Jack Pine Mixture	2.9 ± 1.0	-	-
Low Vegetation	5.6 ± 1.1	-	-
Young Regeneration	3.9 ± 2.2	4.2 + 2.3 ³	-
Total (all Vegetation Community types)	4.8 ± 2.4	4.4 ± 1.7	0.772

NOTE:
¹Vegetation community types with three point count stops or fewer are not included in this table.
²Based on the Keeyask 2001-2011 BBS dataset.
³Mann-Whitney U test was used to compare LSA and RSA sites between years. Significant results are italicized.

To further understand construction impacts, an analysis of distance to disturbance was conducted for 2012 LSA sites (Table 3.1-4). To run the Analysis of Variance (ANOVA) test, data was put into six categories of distance to disturbance: <100m, 101-200m, 201-300m, 301-400m, 401-500m and >500m. The analysis of all sites in the LSA, regardless of habitat type, showed that densities increased with distance away from areas with construction disturbance (ANOVA, $F = 4.7$, $p = 0.02$). To understand if the sites closest to the disturbance were more impacted than those further away, data was reorganized into two distance to disturbance categories, <100m and >100m. Results indicated that sites closest to disturbance (<100m) had significantly lower densities than those that were more than 100m away (ANOVA, $F=10.12$, $p = 0.003$).

As the most dominant vegetation community in the area is black spruce and the greatest number of samples fall within this community type, a distance to disturbance analysis was conducted for LSA sites in black spruce vegetation communities (Table 3.1-4). The analysis did not show a significant difference between the six distance categories (ANOVA, $F = 1.65$, $p = 0.23$). However, this may have been an artifact of the small sample size. Data was re-analysed to compare two distance to disturbance categories for black spruce, <100-m and >100-m. Results

revealed that black spruce sites closest to disturbance (<100m) had significantly lower densities (ANOVA, $F = 4.79$, $p = 0.046$) than those further away (>100m).

Table 3.1-4: Average Bird Densities in LSA sites Categorized by Distance to Disturbance (2012)				
Distance to Disturbance	All Sites		Black Spruce Sites	
	Average Density (Birds/ha)	n	Average Density (Birds/ha)	n
<100m	3.7 ± 1.66	20	3.83 ± 1.85	9
101-200m	4.44 ± 2.1	7	5.65	1
201-300m	5.93 ± 1.76	4	4.8 ± 0.4	2
301-400m	5.31 ± 2.98	5		
401-500m	7.06 ± 2.37	4	6.21 ± 2.04	3
>500m	9.32 ± 1.2	2		

3.1.2 Diversity

As breeding-bird surveys of the Regional Study Area sites were designed to record terrestrial breeding birds using forested areas, the majority (70%) of bird species observed belonged to the passerine group, with 95% of observations being passerines. A total of 54 species of birds were observed during 2012 surveys. Black spruce pure vegetation communities had 39 species, which was the highest species diversity of any of the vegetation communities surveyed (Appendix B, Photo 2; Appendix C, Table C-3). The next most diverse vegetation communities were young regeneration, which had 26 species and black spruce mixture which supported 27 species.

Of the 54 bird species observed in 2012, 59% of the birds observed belonged to one of ten common species (Table 3.1-5). The remaining 41% of the total birds observed encompassed the remaining 45 species (Appendix C, Table C-1). Some of the less common passerines included blue-headed vireo (*Vireo solitarius*), magnolia warbler (*Setophaga magnolia*), and common redpoll (*Acanthis flammea*).

Table 3.1-5: Common Species Observed in Regional Study Area 2012		
Bird Species	Percent of Total Birds Observed	Number of Stops Species Observed in
White-throated sparrow	9%	54
Dark-eyed junco	7%	37
Swamp sparrow	7%	35
Hermit thrush	6%	39
Tennessee warbler	6%	39
Yellow-rumped warbler	5%	34
American robin	5%	29
Northern waterthrush	5%	32
Orange-crowned warbler	5%	33
Ruby-crowned kinglet	5%	31

In most cases, a correlation between bird numbers and the percentage of stops in which these birds were observed was evident (i.e., most abundant bird species were also the species that were most widespread throughout the Regional Study Area sites).

Like density, diversity of birds (number of different species) also appeared similar between LSA and RSA sites (Appendix C, Table C-5). Of the 54 species, 44 species were detected at LSA sites while 38 species were recorded at RSA sites. Blue-headed vireo, common redpoll, magnolia warbler, olive-sided flycatcher, spotted sandpiper (*Actitis macularius*) and yellow warbler (*Setophaga petechia*) were only found at RSA sites. Common grackle (*Quiscalus quiscula*), hairy woodpecker (*Picoides villosus*), Wilson’s snipe (*Gallinago delicata*) and winter wren (*Troglodytes hiemalis*) were only found in the LSA sites. Densities of all of these species were very low, so no specific conclusions can be made about avoidance or attraction to construction. In many instances, these species were only observed once (e.g., common grackle). Variability in the vegetation community structure between black spruce dominated LSA and RSA sites are likely the cause of these observed differences.

The analysis of distance to disturbance for all 2012 LSA sites for 6 distance categories (Table 3.1-6) showed that diversity increased with distance from construction disturbance (ANOVA, $F = 5.22, p = 0.001$).

An analysis of sites in black spruce vegetation communities (Table 3.1-6), did not show a significant difference in diversity between the six distance to disturbance categories (ANOVA, $F = 2.018, p = 0.16$). As this may have been an artifact of small sample size, data was re-analysed to compare two categories, sites within 100m and those further than 100m of disturbance. Results revealed that sites closest to disturbance (<100-m) had significantly lower diversity (ANOVA, $F = 6.69, p = 0.022$) than those further away (>100-m).

Table 3.1-6: Average Bird Diversity in LSA sites Categorized by Distance to Disturbance (2012)				
Distance to Disturbance	All Sites		Black Spruce Sites	
	Average Diversity (Species/ha)	N	Average Density (Species/ha)	N
<100 m	3.45 ± 1.47	20	3.45 ± 1.66	9
101-200 m	4.20 ± 1.87	7	5.09	1
201-300 m	5.51 ± 1.33	4	4.52	2
301-400 m	4.97 ± 2.30	5		
401-500 m	6.07 ± 1.49	4	6.03 ± 1.82	3
>500 m	9.32 ± 0.80	2		

3.1.3 Recording Unit Results

In 2012, three species at risk were identified on recording units deployed throughout the Regional Study Area: olive-sided flycatcher, rusty blackbird and common nighthawk. Common nighthawk was most common, detected at all eight monitoring locations. Olive-sided flycatchers were identified at five of these locations and rusty blackbird at one location (Appendix B, Photo 5; Map 3-3).

Olive-sided flycatchers were recorded within mature and immature black spruce riparian habitat, especially in recently burned areas, while common nighthawks were recorded in open areas generally void of vegetation including recent burns, areas with exposed gravel substrates, rocky outcrops and peat bogs (Appendix D, Table D-1).

3.2 NOCTURNAL OWL SURVEY RESULTS

From 2004 through 2012, owls observed breeding in the Regional Study Area include northern hawk owl (*Surnia ulula*), boreal owl, great-horned owl, great gray owl and long-eared owl (*Asio otus*). Short-eared owl (*Asio flammeus*) has also been detected, however due to limited availability of suitable habitat, they are not expected to breed within the Regional Study Area. Snowy owl (*Nyctea scandiaca*) is known to pass through the area during migration seasons (Godfrey 1986).

Three owl species were detected along the KIP road ROW (via the winter trail) during the 2012 nocturnal surveys including: boreal owl (*Aegolius funereus*), great-horned owl (*Bubo virginianus*) and great-gray owl (*Strix nebulosa*) (Table 3.2-1; Map 3-2). While all three species were detected within the Regional Study Area in 2011 (Map 3-2), monitoring in 2012 marks the first year in which all three were detected along the KIP road ROW. In 2012, this area supported a higher density of nocturnal owls (3.8 owls/10-km²) than PR 280 (1.5 owls/10-km²) and Butnau Road (0.5 owls/10-km²) (Table 3-2.1).

Table 3-2.1: Densities of Owl Species Observed in Regional Study Area 2012				
Species	PR 280	Butnau Road	KIP Road ROW (via the Winter Trail)	Total
Boreal Owl	4		3	7
Great-gray Owl	1	1	1	3
Great-horned Owl	1		2	3
Total Owls	6	1	6	13
Number of Stops	20	10	8	38
Area Surveyed (km ²)	40	20	16	76
Density of Owls (birds/10 km²)	1.5	0.5	3.8	1.7

3.3 PRE-CLEARING AERIAL NEST SURVEY RESULTS

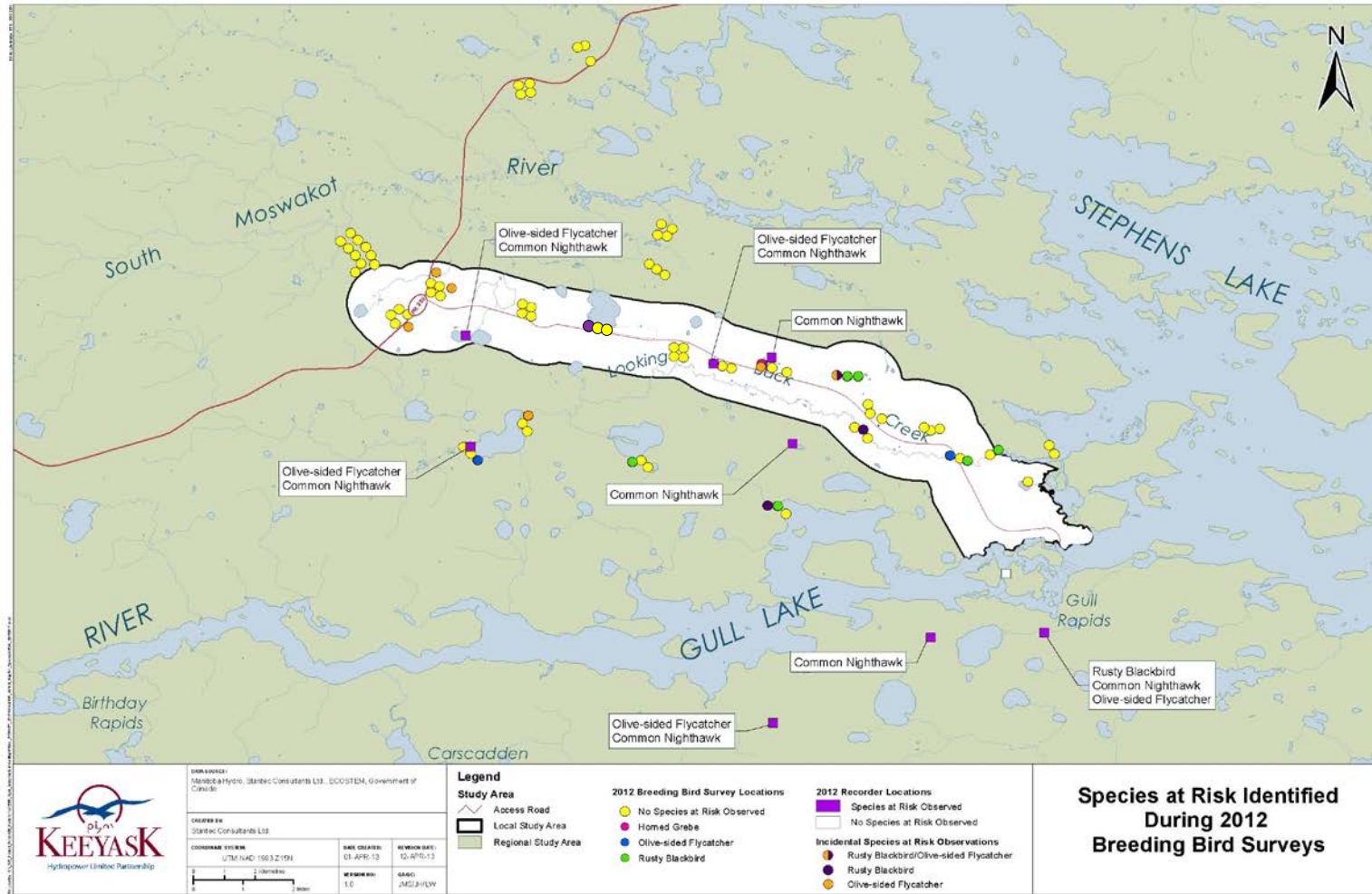
During pre-construction aerial surveys in 2011, two tree-top nests were identified within the KIP Local Study Area. A northern goshawk (*Accipiter gentilis*) nest and a red-tailed hawk (*Buteo jamaicensis*) nest were identified within 150-m and 30-m of the proposed road ROW (Map 3-1). While no fledglings were observed in these nests, their condition suggested they were being prepared for breeding and brood-rearing activities (i.e., the addition of new sticks and pine boughs, etc.).

3.4 INCIDENTALS

Incidental species are those recorded before starting or after ending a point count, or observed en route to another point count plot. In 2012, two species at risk, olive-sided flycatcher and rusty blackbird were noted as incidentals. Four rusty blackbirds and seven olive-sided flycatchers were also recorded outside of survey points (Map 3-1). Other noteworthy incidentals include a sora, a killdeer and a great-horned owl, all of which are known to occur in the area, but rare to observe.

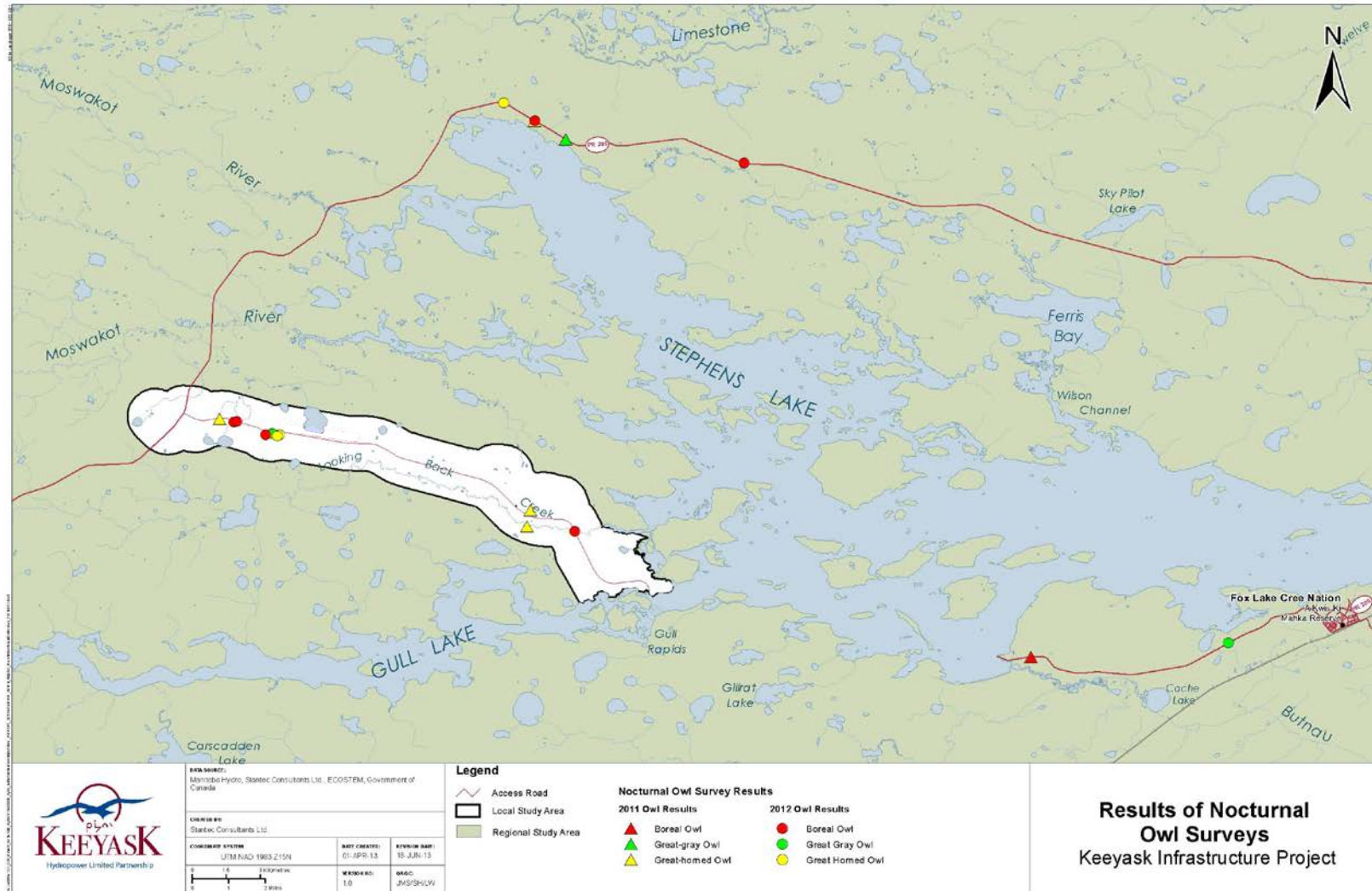
Five of the olive-sided flycatcher incidental observations were inside the LSA area, while two were found near RSA plots. Three of the rusty blackbird observations were within the LSA area,

while one was near a RSA plot. As spatial locations of incidentals are not precise, it is difficult to determine habitat type that individuals were using.



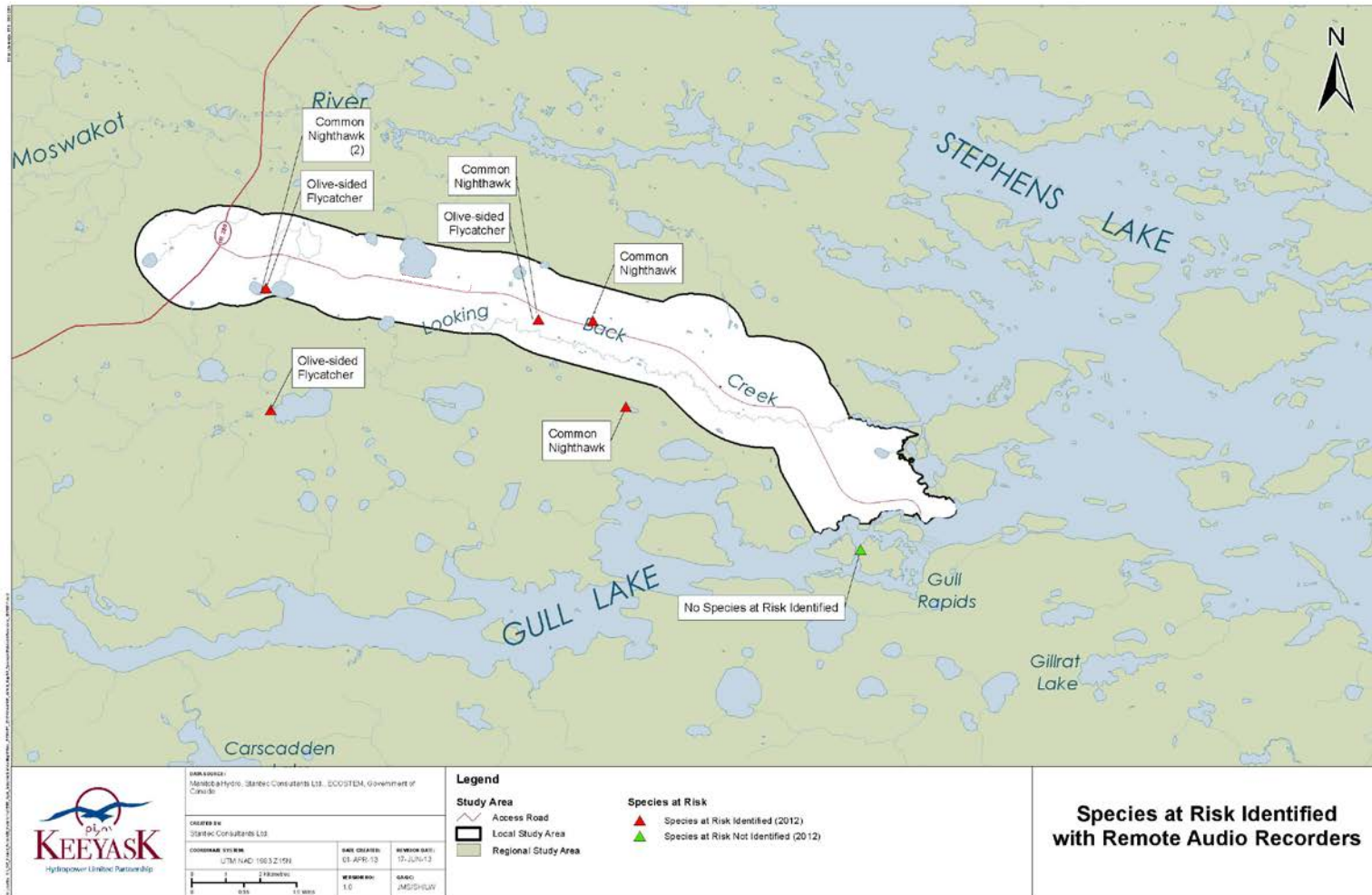
Map 3-1

Map 3-1: Species at Risk Identified During 2012 Breeding-Bird Surveys



Map 3-2

Map 3-2: Results of Nocturnal Owl Surveys 2012



Map 3-3

Map 3-3: Species at Risk Identified with Remote Audio Recorders 2012

4.0 DISCUSSION

During 2012 bird surveys, 54 of the 144 bird species that have been identified during all surveys conducted from 2001 through 2012 in the Regional Study Area were observed. All species identified in the Regional Study Area are representative of Manitoba's northern boreal forest habitats.

4.1 PASSERINES

Based on the 2012 monitoring results for passerines, construction activity appeared to have an effect on the bird community in close proximity to the disturbance within the LSA. At the time of the bird sampling, the road was being built and construction noise was noted by surveyors. As the density and diversity of birds increased with distance from the disturbed areas, it is probable that birds were avoiding the area due to high noise levels. Previous studies on the effects of construction noise on birds have suggested that birds will avoid areas with loud industrial noise, which reduces their densities (Bayne *et al.* 2008) and nesting frequency (Francis *et al.* 2009).

Bird density and diversity was similar between LSA and RSA sites located within the dominant forest community (black spruce). Loss of habitat resulting from land clearing will displace birds into adjacent habitats, which in turn may result in a short-term increase in singing activity (territorial defense behaviour) along edge habitats. For some species, changes in the forest configuration and/or disturbance from construction noise and activity may force individuals to seek alternate habitat located in areas well outside of affected areas (Bayne *et al.* 2008; Francis *et al.* 2009).

As birds forage for insect prey along roads, avian mortality caused by collision with vehicles may decrease densities (Kuitunen *et al.* 1998). Predation of songbirds may increase along the KIP road as nest predation by avian (e.g., common raven, gray jay; Kuitunen *et al.* 1998) or mammalian (e.g., red squirrel, mice, voles; Darveau *et al.* 1997) predators is higher along habitat edges, where predators tend to forage.

With the exception of fox sparrow (*Passerella iliaca*), dark-eyed junco (*Junco hyemalis*) and ruby-crowned kinglet (*Regulus calendula*), most birds observed in LSA sites occurred at similar densities within RSA sites. Although highly variable, the fox sparrow appeared to be more abundant in RSA sites. Fox sparrow is a ground nester who prefers a thick cover of shrubs (Weckstein *et al.* 2002). They may have been less abundant within the LSA sites due to vegetation clearing or construction disturbance (e.g., noise and activity). Dark-eyed junco prefers areas with sparse canopy cover, edge habitats, early-stage post-disturbance habitats and drier locations (Nolan *et al.* 2002). Vegetation clearing and creation of edge habitat in the LSA area likely attracted local dark-eyed juncos to sampled edge sites. As ruby-crowned kinglets are a generalist species, they are also known to use edge habitat. Similar to our results which showed higher abundances of ruby-crowned kinglet in LSA sites as compared to RSA sites, St. Laurent *et al.* (2009) found that abundances of ruby-crowned kinglet increased with forest clearing activities, possibly due to the short-term crowding of edge habitat. All of the bird species that were observed only at RSA sites or LSA sites were in very low densities (Appendix C, Table C-5). As birds respond to forest structure, small differences in the habitat between LSA and RSA sites may explain some of differences observed them.

To better understand if changes in the bird community are due to construction activity, monitoring efforts in 2013 will involve an increase in sample size within the common broad vegetation types (based on ECOSTEM's habitat classification in Keeyask Hydropower Limited Partnership 2009) characteristic of both the LSA and RSA areas.

4.2 OWLS

Most of the owl species known to breed within the Regional Study Area forage along forest openings that support a prey base (e.g., mice, voles). The 2012 owl survey results show a cluster of owls (3 species identified) within close proximity to a cleared borrow site. As predicted in the EIS, it was anticipated that owls would be drawn to some of the areas cleared for Project infrastructure (e.g., borrow sites) due to enhanced forage opportunities. While it is recognized that owl populations fluctuate cyclically relative to rodent population cycles (Hanski *et al.* 2001),

this observed change in owl distribution (compared to 2011 baseline data) along the KIP road ROW is likely attributed to landscape changes resulting from clearing activities.

4.3 SPECIES AT RISK

Between 2004 and 2012, four species that are considered at risk as defined by COSEWIC, SARA Schedule 1 and/or MESA, have been identified in the KIP Regional Study Area (rusty blackbird, common nighthawk, olive-sided flycatcher and horned grebe). Yellow rail and short-eared owl, which are also assessed by COSEWIC, and listed under SARA and/or MESA, were not directly observed. However, they may utilize the larger KIP Regional Study Area.

Rusty Blackbird

Rusty blackbird is a short-distance migrant songbird considered a species of *special concern* by COSEWIC (2010) and listed on Schedule 1 of SARA (Government of Canada 2009). The breeding range of this species covers much of central and northern Manitoba, fully encompassing the Study Area (Godfrey 1986). In recent years, presence of the rusty blackbird has become somewhat uncommon in the north (COSEWIC 2006 and Carey *et al.* 2003).

Rusty blackbird observations in 2012 occurred at survey stops consistent with this species' favoured habitat of forested riparian edges, located along or adjacent to the KIP road ROW route (Map 3-1). Preferred habitats include the margins of treed muskeg, slow moving streams, bogs, and marshes (LaRue *et al.* 1995 and Whitaker and Montevicchi 1997). This species is also known to nest within riparian vegetation along riparian edges, near, or above a water body (COSEWIC 2006). Despite the loss of some preferred habitat along the KIP road ROW, rusty blackbird continues to use alternate habitats in adjacent areas. The availability of suitable rusty blackbird habitat is widespread throughout the Local and Regional Study Areas.

Olive-Sided Flycatcher

The olive-sided flycatcher is a long-distance migrant songbird listed as *threatened* by COSEWIC and listed on Schedule 1 of SARA (COSEWIC 2010, Government of Canada 2009). The breeding range of the olive-sided flycatcher covers a large portion of the northwestern and central boreal forest of Manitoba, excluding the northernmost extent and eastern coast of the

province (Peterson and Peterson 2002). The Local Study Area is likely near the northern extent of this species' breeding range.

In 2012, the seven olive-sided flycatchers detected were associated with riparian edge habitat. The preferred breeding habitat for this species includes forest openings and edges, often associated with bogs or other wet areas that contain tall trees or snags on which to perch (COSEWIC 2007b). During 2012 monitoring studies, five olive-sided flycatchers were recorded within black spruce riparian habitat and two in regenerating forest near riparian habitat (where patches of mature trees remained). Two of these detections occurred within close proximity to the KIP road ROW, near Looking Back Creek (Map 3-1).

Common Nighthawk

The common nighthawk is a long-distance migrant listed as *threatened* by COSEWIC and Schedule 1 of SARA (COSEWIC 2010 and Government of Canada 2009) and a *threatened species* by MESA (2010).

The Local Study Area is located near the northeast edge of the common nighthawk's breeding range. With the exception of the northern extent of its range, nighthawks are considered common breeders throughout most of Manitoba and are known to nest on a range of open areas generally void of vegetation including recent burns, gravel substrates, rocky outcrops and peat bogs (Carey *et al.* 2003 and COSEWIC 2007a).

Suitable habitat for common nighthawk is widespread throughout the Regional Study Area. This species was detected at most sites monitored with recording units, including in areas along the KIP road ROW (Map 3-1).

Horned Grebe

Horned grebe has been assessed as a species of *special concern* by COSEWIC (2010), but is not currently listed under SARA (Government of Canada, 2009). Horned grebe is normally found in small to moderately sized freshwater ponds, marshes and bays with emergent vegetation (Stedman 2000). Population declines in horned grebe are mainly attributed to wetland loss and

degradation in agricultural areas (Stedman 2000). A horned grebe was observed in a small pond that is along the north side of the KIP road ROW.

Yellow Rail

The yellow rail has been assessed by COSEWIC (2010) and is listed as a species of *special concern* under Schedule 1 of SARA (Government of Canada 2009) and is considered a species that may inhabit the Regional Study Area. A short-distant migrant, yellow rail is typically found among grassy fens and/or wet meadows and is considered to be an uncommon to local breeder in wetlands throughout the province except for extreme northwestern Manitoba (Carey *et al.* 2003 and Government of Canada 2010a). While the lack of direct observations of this species during avian field surveys does not preclude the possibility of its existence in the Local Study Area, the mostly likely reason for non-observance is due to the lack of suitable breeding habitat. Although marginal yellow rail habitat occurs within the Local Study Area, Project effects on this species habitat were not expected (KIP EA 2009). Furthermore, investigations for yellow rails in 2012 did not indicate that construction activities were impacting potential yellow rail habitat.

5.0 CONCLUSIONS

Based on the 2012 monitoring results for passerines, construction activity including road clearing and borrow pit use appeared to have an effect on the bird community in close proximity to construction activities, but no notable impact on the overall bird community in the study area. The reduction in densities and diversity in close proximity to impacted areas due to avoidance of construction noise is typically short term and very localized. Overall, bird density and diversity was similar between LSA and RSA sites, indicating that there was little to no notable impact on the overall passerine bird community in this first year of construction monitoring.

Although several species (i.e., fox sparrow, ruby-crowned kinglet and dark-eyed junco) had different relative abundances in the LSA areas as compared to the RSA areas, known habitat preferences for these species may account these differences. Many species (such as ruby-crowned kinglet and dark-eyed junco) are known to use or even prefer edge habitat and it is common to note higher densities of edge species near areas of cleared forest. Future breeding-bird monitoring studies will help to clarify these relationships and test EA predictions.

The nocturnal owl surveys showed an increase in owl numbers near newly cleared areas (e.g., KIP road and borrow sites) as compared to existing infrastructure, likely due to enhanced forage opportunities. Although owl populations fluctuate cyclically with rodent populations, the changes in owl distribution in 2012 as compared with the 2011 baseline data is a fairly strong indication that landscape changes resulting from clearing activities along the KIP road and borrow pit areas may have an effect on owl distribution.

The 2011 aerial nest surveys revealed the presence of two potentially active raptor nests along the proposed access road ROW. The nesting birds were not disturbed.

Several species at risk, including rusty blackbird, olive-sided flycatcher, and common nighthawk were recorded within the LSA area and at the RSA sites. A single horned grebe was observed in a pond near the KIP road within the LSA area. Observations for all species at risk occurred

within the known preferred habitat types for each species. Further years of monitoring and targeted species at risk surveys will help to explain any effects resulting from construction.

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APPENDIX A

GLOSSARY

Bog – wetland ecosystem characterized by an accumulation of peat, acid conditions and a plant community dominated by sphagnum moss.

Boreal Forest – a nearly continuous belt of primarily coniferous trees across northern Canada which overlies formerly glaciated areas.

Cutting Class – a forest stand classification system wherein class is based on size, vigour, state of development and maturity of a stand for harvesting purposes.

Endangered species – where the Lieutenant Governor in Council determines that a species indigenous to Manitoba is threatened with imminent extinction or with extirpation throughout all or a significant portion of its Manitoba range, the Lieutenant Governor in Council may, by regulation, declare the species an endangered species.

Habitat – the place where a plant or animal lives; often related to a function such as feeding, nesting, etc.

Important Bird Habitat – sites used by an estimated one percent or more of a population, or species group with respect to bird species protected under the Migratory Birds Convention Act – categories include nationally important, regionally important and locally important.

Landform – a physical feature of a landscape, such as a river, lake, estuary, etc.

Mixedwoods – forests consisting of a mix of coniferous and deciduous tree species.

Passerine – a member of the very large order Passeriformes, usually called ‘perching birds’; as their anatomy allows them to perch on branches, unlike a duck or goose.

Raptor – any of a group of predatory, meat-eating birds, such as hawks, owls, osprey, falcons and eagles.

Riparian area – the area along a watercourse or around a lake or pond.

ROW – a “Right-of-Way,” the strip of land through which roadways, railroads, or power lines are built, operated and maintained.

Shorebird – any of a group of wading birds that frequent shorelines of lakes, rivers, ponds or oceans.

Special Concern – a wildlife species that may become threatened or endangered because of a combination of biological characteristics and identified threats.

Sublandform – a physical feature of or within a larger landform, such as creeks, islands and terraces within a river.

Threatened – a wildlife species that is likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction.

Threatened species –where the Lieutenant Governor in Council determines that a species indigenous to Manitoba (a) is likely to become endangered; or (b) is, because of low or declining numbers in Manitoba, particularly at risk if the factors affecting its vulnerability do not become reversed; the Lieutenant Governor in Council may, by regulation, declare the species a threatened species.

Waterbirds – birds that spend much of the time foraging and feeding in the water, and lay their eggs near the water. Includes geese and ducks as well as gulls, terns, loons, pelicans, cormorants, swans, grebes, bitterns, herons, rails and cranes.

APPENDIX B

PHOTOGRAPHS



Photo 1 – Black Spruce Mixture Vegetation Community



Photo 2 – Black Spruce Pure Vegetation Community



Photo 3 – Jack Pine Mixture Vegetation Community



Photo 4 – Young Regenerating Vegetation Community



Photo 5 – Remote Audio Recorder Set-up

APPENDIX C

BREEDING-BIRD SURVEY DATA

Table C-1 Species Detected During Breeding Bird Surveys Keyask Infrastructure Project Regional Study Area - 2012				
Species	Total Number of Birds	Number of Stops	Percent (%) of total birds observed	Percent (%) of stops observed at
Alder Flycatcher	25	23	3.82	3.84
American Robin	30	29	4.59	4.84
Bald Eagle	1	1	0.15	0.17
Belted Kingfisher	1	1	0.15	0.17
Black-and-white warbler	1	1	0.15	0.17
Blackpoll Warbler	12	12	1.83	2.00
Blue-headed Vireo	2	2	0.31	0.33
Cedar Waxwing	7	5	1.07	0.83
Chipping Sparrow	5	5	0.76	0.83
Common Loon	2	1	0.31	0.17
Common Redpoll	1	1	0.15	0.17
Dark-eyed Junco	44	37	6.73	6.18
Fox Sparrow	27	25	4.13	4.17
Gray Jay	17	15	2.60	2.50
Greater Yellowlegs	1	1	0.15	0.17
Hairy Woodpecker	9	8	1.38	1.34
Hermit Thrush	39	39	5.96	6.51
Horned Grebe	1	1	0.15	0.17
Least Flycatcher	1	1	0.15	0.17
Lesser Yellowlegs	5	4	0.76	0.67
Lincoln's Sparrow	11	10	1.68	1.67
Magnolia Warbler	14	14	2.14	2.34
Northern Flicker	1	1	0.15	0.17
Northern Waterthrush	35	32	5.35	5.34
Olive-sided Flycatcher	2	2	0.31	0.33
Orange-crowned Warbler	35	33	5.35	5.51

Table C-1 Species Detected During Breeding Bird Surveys Keyask Infrastructure Project Regional Study Area - 2012				
Species	Total Number of Birds	Number of Stops	Percent (%) of total birds observed	Percent (%) of stops observed at
Palm Warbler	22	21	3.36	3.51
Pine Grosbeak	1	1	0.15	0.17
Ring-billed Gull	1	1	0.15	0.17
Ruby-crowned Kinglet	33	31	5.05	5.18
Rusty Blackbird	7	5	1.07	0.83
Solitary Sandpiper	9	9	1.38	1.50
Song Sparrow	1	1	0.15	0.17
Spotted Sandpiper	2	1	0.31	0.17
Swainson's Thrush	13	13	1.99	2.17
Swamp Sparrow	46	35	7.03	5.84
Tennessee Warbler	40	39	6.12	6.51
Tree Swallow	5	3	0.76	0.50
White-throated Sparrow	61	54	9.33	9.02
Wilson's Snipe	3	3	0.46	0.50
Wilson's Warbler	11	11	1.68	1.84
Winter Wren	3	3	0.46	0.50
Yellow Warbler	8	7	1.22	1.17
Yellow-bellied Flycatcher	20	20	3.06	3.34
Yellow-rumped Warbler	35	34	5.35	5.68
Common Grackle	4	3	0.61	0.50
Grand Total	654	599	100	100

Table C-2 Bird Species Known or Expected to Utilize the Keyask Regional Study Area			
Scientific Name	Common Name	Status¹	Observed Using the Study Area²
Loons			
<i>Gavia pacifica</i>	Pacific Loon	M	<input type="checkbox"/>
<i>Gavia immer</i>	Common Loon	B	<input type="checkbox"/>
Grebes			
<i>Podilymbus podiceps</i>	Pied-billed Grebe	B	<input type="checkbox"/>
<i>Podiceps auritus</i>	Horned Grebe	B	<input type="checkbox"/>
<i>Podiceps grisegena</i>	Red-necked Grebe	B	<input type="checkbox"/>
Pelicans and Cormorants			
<i>Pelecanus erythrorhynchos</i>	American White Pelican	N	<input type="checkbox"/>
<i>Phalacrocorax auritus</i>	Double-crested Cormorant	N	<input type="checkbox"/>
Hérons and Bitterns			
<i>Botaurus lentiginosus</i>	American Bittern	B	<input type="checkbox"/>
<i>Ardea herodias</i>	Great Blue Heron	B	<input type="checkbox"/>
Swans			
<i>Cygnus columbianus</i>	Tundra Swan	M	<input type="checkbox"/>
Geese			
<i>Anser albifrons</i>	Greater White-fronted Goose	M	
<i>Anser caerulescens</i>	Snow Goose	M	<input type="checkbox"/>
<i>Anser rossii</i>	Ross's Goose	M	
<i>Branta canadensis</i>	Canada Goose	B	<input type="checkbox"/>
Ducks			
<i>Anas crecca</i>	Green-winged Teal	B	<input type="checkbox"/>
<i>Anas rubripes</i>	American Black Duck	B	<input type="checkbox"/>
<i>Anas platyrhynchos</i>	Mallard	B	<input type="checkbox"/>
<i>Anas acuta</i>	Northern Pintail	B	<input type="checkbox"/>
<i>Anas discors</i>	Blue-winged Teal	B	<input type="checkbox"/>
<i>Anas clypeata</i>	Northern Shoveller	B	<input type="checkbox"/>
<i>Anas strepera</i>	Gadwall	B,N	<input type="checkbox"/>
<i>Anas americana</i>	American Wigeon	B	<input type="checkbox"/>
<i>Aythya valisinerina</i>	Canvasback	B?,N	
<i>Aythya americana</i>	Redhead	B?,N	
<i>Aythya collaris</i>	Ring-necked Duck	B	<input type="checkbox"/>

Table C-2 Bird Species Known or Expected to Utilize the Keyask Regional Study Area			
Scientific Name	Common Name	Status¹	Observed Using the Study Area²
<i>Aythya marila</i>	Greater Scaup	M	<input type="checkbox"/>
<i>Aythya affinis</i>	Lesser Scaup	B	<input type="checkbox"/>
<i>Somateria mollissima</i>	Common Eider	M	
<i>Melanitta nigra</i>	Black Scoter	M	<input type="checkbox"/>
<i>Melanitta perspicillata</i>	Surf Scoter	M	<input type="checkbox"/>
<i>Melanitta fusca</i>	White-winged Scoter	B	<input type="checkbox"/>
<i>Bucephala clangula</i>	Common Goldeneye	B	<input type="checkbox"/>
<i>Bucephala albeola</i>	Bufflehead	B	<input type="checkbox"/>
<i>Lophodytes cucullatus</i>	Hooded Merganser	B	<input type="checkbox"/>
<i>Mergus merganser</i>	Common Merganser	B	<input type="checkbox"/>
<i>Mergus serrator</i>	Red-breasted Merganser	B	<input type="checkbox"/>
Gulls and Terns			
<i>Stercorarius parasiticus</i>	Parasitic Jaeger	B?	<input type="checkbox"/>
<i>Larus philadelphia</i>	Bonaparte's Gull	B	<input type="checkbox"/>
<i>Larus delawarensis</i>	Ring-billed Gull	B	<input type="checkbox"/>
<i>Larus argentatus</i>	Herring Gull	B	<input type="checkbox"/>
<i>Sterna caspia</i>	Caspian Tern	B	<input type="checkbox"/>
<i>Sterna hirundo</i>	Common Tern	B	<input type="checkbox"/>
<i>Sterna paradisaea</i>	Arctic Tern	M	<input type="checkbox"/>
<i>Chlidonias niger</i>	Black Tern	?	<input type="checkbox"/>
Accipters (Hawks and Eagles)			
<i>Pandion haliaetus</i>	Osprey	B	<input type="checkbox"/>
<i>Haliaeetus leucocephalus</i>	Bald Eagle	B	<input type="checkbox"/>
<i>Circus cyaneus</i>	Northern Harrier	B	<input type="checkbox"/>
<i>Accipiter striatus</i>	Sharp-shinned Hawk	B	<input type="checkbox"/>
<i>Accipiter gentilis</i>	Northern Goshawk	P	<input type="checkbox"/>
<i>Buteo jamaicensis</i>	Red-tailed Hawk	B	<input type="checkbox"/>
<i>Buteo lagopus</i>	Rough-legged Hawk	M	<input type="checkbox"/>
<i>Aquila chrysaetos</i>	Golden Eagle	M	<input type="checkbox"/>
Falcons			
<i>Falco sparverius</i>	American Kestrel	B	<input type="checkbox"/>
<i>Falco columbarius</i>	Merlin	B	<input type="checkbox"/>

Table C-2 Bird Species Known or Expected to Utilize the Keyask Regional Study Area			
Scientific Name	Common Name	Status¹	Observed Using the Study Area²
<i>Falco peregrinus anatum</i>	Peregrine Falcon	M	<input type="checkbox"/>
<i>Falco rusticolus</i>	Gyr Falcon	W?	
Owls			
<i>Bubo virginianus</i>	Great Horned Owl	P	<input type="checkbox"/>
<i>Nyctea scandiaca</i>	Snowy Owl	M,W	<input type="checkbox"/>
<i>Surnia ulula</i>	Northern Hawk-Owl	P	<input type="checkbox"/>
<i>Strix nebulosa</i>	Great Gray Owl	P	<input type="checkbox"/>
<i>Asio otus</i>	Long-eared Owl	B	<input type="checkbox"/>
<i>Asio flammeus</i>	Short-eared Owl	B	<input type="checkbox"/>
<i>Aegolius funerus</i>	Boreal Owl	P	<input type="checkbox"/>
Vultures			
<i>Cathartes aura</i>	Turkey vulture	N	<input type="checkbox"/>
Upland Gamebirds			
<i>Dendragapus canadensis</i>	Spruce Grouse	P	<input type="checkbox"/>
<i>Lagopus lagopus</i>	Willow Ptarmigan	W	<input type="checkbox"/>
<i>Bonasa umbellus</i>	Ruffed Grouse	P	<input type="checkbox"/>
<i>Tympanuchus phasianellus</i>	Sharp-tailed Grouse	P	<input type="checkbox"/>
Rails and Cranes			
<i>Coturnicops noveboracensis</i>	Yellow Rail	B	
<i>Porzana carolina</i>	Sora	B	<input type="checkbox"/>
<i>Fulica americana</i>	American Coot	B	
<i>Grus canadensis</i>	Sandhill Crane	B	<input type="checkbox"/>
Shorebirds			
<i>Pluvialis squatarola</i>	Black-bellied plover	M	<input type="checkbox"/>
<i>Pluvialis dominica</i>	Lesser golden-Plover	M	
<i>Charadrius semipalmatus</i>	Semipalmated Plover	M	<input type="checkbox"/>
<i>Charadrius vociferus</i>	Killdeer	B	<input type="checkbox"/>
<i>Tringa melanoleuca</i>	Greater Yellowlegs	B	<input type="checkbox"/>
<i>Tringa flavipes</i>	Lesser Yellowlegs	B	<input type="checkbox"/>
<i>Tringa solitaria</i>	Solitary Sandpiper	B	<input type="checkbox"/>
<i>Actitis macularia</i>	Spotted Sandpiper	B	<input type="checkbox"/>
<i>Numenius phaeopus</i>	Whimbrel	M	<input type="checkbox"/>

Table C-2 Bird Species Known or Expected to Utilize the Keyask Regional Study Area			
Scientific Name	Common Name	Status¹	Observed Using the Study Area²
<i>Limosa haemastica</i>	Hudsonian Godwit	M	
<i>Arenaria interpres</i>	Ruddy Turnstone	M	<input type="checkbox"/>
<i>Calidris conutus</i>	Red Knot	M	
<i>Calidris alba</i>	Sanderling	M	
<i>Calidris pusilla</i>	Semipalmated Sandpiper	M	<input type="checkbox"/>
<i>Calidris minutilla</i>	Least Sandpiper	M	
<i>Calidris fuscicollis</i>	White-rumped Sandpiper	M	
<i>Calidris bairdii</i>	Baird's Sandpiper	M	
<i>Calidris melanotos</i>	Pectoral Sandpiper	M	
<i>Calidris alpina</i>	Dunlin	M?	<input type="checkbox"/>
<i>Limnodromus griseus</i>	Short-billed Dowitcher	M	
<i>Gallinago delicata</i>	Wilson's Snipe	B	<input type="checkbox"/>
<i>Phalaropus lobatus</i>	Red-necked Phalarope	M	
Nighthawks			
<i>Chordeiles minor</i>	Common Nighthawk	B	<input type="checkbox"/>
Hummingbirds			
<i>Archilochus colubris</i>	Ruby-throated Hummingbird	B,N	
Kingfishers			
<i>Ceryle alcyon</i>	Belted Kingfisher	B	<input type="checkbox"/>
Woodpeckers			
<i>Picoides pubescens</i>	Downy Woodpecker	P	<input type="checkbox"/>
<i>Picoides villosus</i>	Hairy Woodpecker	P	<input type="checkbox"/>
<i>Picoides tridactylus</i>	Three-toed Woodpecker	P	<input type="checkbox"/>
<i>Picoides arcticus</i>	Black-backed Woodpecker	P	<input type="checkbox"/>
<i>Colaptes auratus</i>	Northern Flicker	B	<input type="checkbox"/>
<i>Sphyrapicus varius</i>	Yellow-bellied Sapsucker	B,N	<input type="checkbox"/>
Passerines			
<i>Contopus borealis</i>	Olive-sided Flycatcher	B	<input type="checkbox"/>
<i>Empidonax flaviventris</i>	Yellow-bellied Flycatcher	B	<input type="checkbox"/>
<i>Empidonax alnorum</i>	Alder Flycatcher	B	<input type="checkbox"/>
<i>Empidonax minimus</i>	Least Flycatcher	B	<input type="checkbox"/>
<i>Eremophila alpestris</i>	Horned Lark	M,W	

Table C-2 Bird Species Known or Expected to Utilize the Keyask Regional Study Area			
Scientific Name	Common Name	Status ¹	Observed Using the Study Area ²
<i>Tachycineta bicolor</i>	Tree Swallow	B	<input type="checkbox"/>
<i>Riparia riparia</i>	Bank Swallow	B	<input type="checkbox"/>
<i>Hirundo pyrrhonota</i>	Cliff Swallow	B	<input type="checkbox"/>
<i>Hirundo rustica</i>	Barn Swallow	B	<input type="checkbox"/>
<i>Perisoreus canadensis</i>	Gray Jay	P	<input type="checkbox"/>
<i>Pica pica</i>	Black-billed Magpie	P	
<i>Corvus brachyrhynchos</i>	American Crow	P	<input type="checkbox"/>
<i>Corvus corax</i>	Common Raven	P	<input type="checkbox"/>
<i>Parus hudsonicus</i>	Boreal Chickadee	P	<input type="checkbox"/>
<i>Sitta canadensis</i>	Red-breasted Nuthatch	P	<input type="checkbox"/>
<i>Troglodytes troglodytes</i>	Winter Wren	B	<input type="checkbox"/>
<i>Regulus satrapa</i>	Golden-crowned Kinglet	B	<input type="checkbox"/>
<i>Regulus calendula</i>	Ruby-crowned Kinglet	B	<input type="checkbox"/>
<i>Catharus minimus</i>	Gray-cheeked Thrush	M	<input type="checkbox"/>
<i>Catharus ustulatus</i>	Swainson's Thrush	B	<input type="checkbox"/>
<i>Catharus guttatus</i>	Hermit Thrush	B	<input type="checkbox"/>
<i>Turdus migratorius</i>	American Robin	B	<input type="checkbox"/>
<i>Bombycilla garrulus</i>	Bohemian Waxwing	B	
<i>Bombycilla cedrorum</i>	Cedar Waxwing	B	<input type="checkbox"/>
<i>Lanius excubitor</i>	Northern Shrike	M	<input type="checkbox"/>
<i>Moqueur roux</i>	Brown Thrasher	B?	
<i>Certhia americana</i>	Brown Creeper	B	<input type="checkbox"/>
<i>Sturnus vulgaris</i>	European Starling	B,I	
<i>Vireo solitarius</i>	Blue-headed Vireo	B	<input type="checkbox"/>
<i>Vireo philadelphicus</i>	Philadelphia Vireo	B	
<i>Vireo olivaceus</i>	Red-eyed Vireo	B	<input type="checkbox"/>
<i>Vermivora peregrina</i>	Tennessee Warbler	B	<input type="checkbox"/>
<i>Vermivora celata</i>	Orange-crowned Warbler	B	<input type="checkbox"/>
<i>Dendroica petechia</i>	Yellow Warbler	B	<input type="checkbox"/>
<i>Dendroica magnolia</i>	Magnolia Warbler	B	<input type="checkbox"/>
<i>Dendroica tigrina</i>	Cape May Warbler	B	<input type="checkbox"/>
<i>Dendroica coronata</i>	Yellow-rumped Warbler	B	<input type="checkbox"/>
<i>Dendroica fusca</i>	Blackburnian Warbler	B	<input type="checkbox"/>

Table C-2 Bird Species Known or Expected to Utilize the Keyask Regional Study Area			
Scientific Name	Common Name	Status ¹	Observed Using the Study Area ²
<i>Dendroica palmarum</i>	Palm Warbler	B	<input type="checkbox"/>
<i>Dendroica castanea</i>	Bay-breasted Warbler	B	<input type="checkbox"/>
<i>Dendroica striata</i>	Blackpoll Warbler	B	<input type="checkbox"/>
<i>Mniotilta varia</i>	Black-and-white Warbler	B	<input type="checkbox"/>
<i>Seiurus aurocapillus</i>	Ovenbird	B	<input type="checkbox"/>
<i>Seiurus noveboracensis</i>	Northern Waterthrush	B	<input type="checkbox"/>
<i>Wilsonia pusilla</i>	Wilson's Warbler	B	<input type="checkbox"/>
<i>Pheucticus ludovicianus</i>	Rose-breasted Grosbeak	B	<input type="checkbox"/>
<i>Spizella arborea</i>	American Tree Sparrow	B	<input type="checkbox"/>
<i>Spizella passerina</i>	Chipping Sparrow	B	<input type="checkbox"/>
<i>Spizella pallida</i>	Clay-colored Sparrow	B?,N	<input type="checkbox"/>
<i>Passerculus sandwichensis</i>	Savannah Sparrow	B	<input type="checkbox"/>
<i>Ammodramus leconteii</i>	Le Conte's Sparrow	B	<input type="checkbox"/>
<i>Passerella iliaca</i>	Fox Sparrow	B	<input type="checkbox"/>
<i>Melospiza melodia</i>	Song Sparrow	B	<input type="checkbox"/>
<i>Melospiza lincolni</i>	Lincoln's Sparrow	B	<input type="checkbox"/>
<i>Melospiza georgiana</i>	Swamp Sparrow	B	<input type="checkbox"/>
<i>Zonotrichia albicollis</i>	White-throated Sparrow	B	<input type="checkbox"/>
<i>Zonotrichia leucophrys</i>	White-crowned Sparrow	B	<input type="checkbox"/>
<i>Zonotrichia querula</i>	Harris's Sparrow	M	
<i>Junco hyemalis</i>	Dark-eyed Junco	B	<input type="checkbox"/>
<i>Calcarius lapponicus</i>	Lapland Longspur	M	
<i>Calcarius pictus</i>	Smith's Longspur	M	
<i>Plectrophenax nivalis</i>	Snow Bunting	M	<input type="checkbox"/>
<i>Agelaius phoeniceus</i>	Red-winged Blackbird	B	<input type="checkbox"/>
<i>Euphagus carolinus</i>	Rusty Blackbird	B	<input type="checkbox"/>
<i>Quiscalus quiscula</i>	Common Grackle	B	<input type="checkbox"/>
<i>Pinicola enucleator</i>	Pine Grosbeak	P	<input type="checkbox"/>
<i>Loxia curvirostra</i>	Red Crossbill	P	<input type="checkbox"/>
<i>Loxia leucoptera</i>	White-winged Crossbill	P	<input type="checkbox"/>
<i>Carduelis flammea</i>	Common Redpoll	P	<input type="checkbox"/>
<i>Carduelis hornemanni</i>	Hoary Redpoll	M,W	
<i>Carduelis pinus</i>	Pine Siskin	B?,N	

Table C-2			
Bird Species Known or Expected to Utilize the Keyask Regional Study Area			
Scientific Name	Common Name	Status¹	Observed Using the Study Area²
<i>Passer domesticus</i>	House Sparrow	B,I	
TOTAL SPECIES OBSERVED IN REGIONAL STUDY AREA			144
<p>Source: Godfrey 1986; Manitoba Naturalists Society 2003</p> <p>¹ B = breeding, M = migrant; P = permanent resident; N = northern extent of range; W = winter range; I = introduced;</p> <p>? = appropriate habitat uncertain</p> <p>² Bird Surveys from 2001 to 2012</p>			

**Table C-3
Presence of Bird Species in Keyask Infrastructure Project Regional Study Area - 2012**

Species	Vegetation Community Type ¹						Grand Total
	Black Spruce Mixture (n=14)	Black Spruce Pure (n=30)	Jack Pine Mixture (n=7)	Low Vegetation (n=5)	Tall Shrub (n=5)	Young Regeneration (n=10)	
Alder Flycatcher	8	6		2	4	6	26
American Robin	2	15	1	1	3	2	24
Bald Eagle					1		1
Belted Kingfisher				1			1
Blackpoll Warbler	2	5			1	1	9
Blue-headed Vireo		1	1				2
Cedar Waxwing	2				4	1	7
Chipping Sparrow	3	1				1	5
Common Grackle		1			3		4
Common Loon					2		2
Common Redpoll		1					1
Dark-eyed Junco	4	34	1		3		42
Fox Sparrow	8	10	2		1	2	23
Gray jay	6	6	1	1		1	15
Greater Yellowlegs			1				1
Hairy Woodpecker		1		1		5	7
Hermit Thrush	4	14	5	2	2	7	34
Horned Grebe				1			1
Lesser Yellowlegs				5			5
Lincoln's Sparrow	4	4		2		1	11
Magnolia Warbler	3	4				1	8
Northern Flicker						1	1
Northern Waterthrush	8	13		1	8	2	32
Olive-sided Flycatcher	1					1	2
Orange-crowned Warbler	9	10	4	1		7	31
Palm Warbler	5	8	2	5		1	21
Ruby-crowned Kinglet	6	17	3	1	1	4	32

**Table C-3
Presence of Bird Species in Keyask Infrastructure Project Regional Study Area - 2012**

Species	Vegetation Community Type ¹						Grand Total
	Black Spruce Mixture (n=14)	Black Spruce Pure (n=30)	Jack Pine Mixture (n=7)	Low Vegetation (n=5)	Tall Shrub (n=5)	Young Regeneration (n=10)	
Rusty Blackbird	1	3			2	1	7
Solitary Sandpiper		3		3	2		8
Spotted Sandpiper		1					1
Swainson's Thrush	1	10	3			1	15
Swamp Sparrow	7	17		5	11	2	42
Tennessee Warbler	11	14	4	4	2		35
Tree Swallow					3	2	5
White-throated Sparrow	11	15		7	9	12	54
Wilson's Snipe		1		1	1		3
Wilson's Warbler	3	1		3	1	2	10
Winter Wren		2					2
Yellow Warbler					4	3	7
Yellow-bellied Flycatcher	7	6	2	1		1	17
Yellow-rumped Warbler	6	18	4		1	1	30
Total Number of Birds	122	242	34	48	69	69	584
Average Density (per hectare)	0.2 ± 0.1	0.2 ± 0.1	0.2 ± 0.1	0.3 ± 0.2	0.4 ± 0.3	0.1 ± 0.1	0.1 ± 0.1
Average Diversity (per stop)	8.3 ± 3.0	7.4 ± 2.9	4.7 ± 1.7	9.2 ± 1.5	10.8 ± 4.3	6.5 ± 3.2	7.5 ± 3.3
Number of Species	24	30	14	20	22	26	41

NOTE:

¹Vegetation community types with three point count stops or fewer are not included in this table and not utilized in habitat analysis.

Table C-4 Comparison of Density and Diversity Among Study Areas and Study Years				
Study Area	Year	Sample Size	Overall Bird Density (Birds/ha)	Overall Bird Diversity (Species/ stop)
Keeyask North Access Road	2012	81	4.6 ± 2.1	8.2 ± 3.7
Keeyask North Access Road	2011	79	2.1 ± 1.3	3.5 ± 2.0
Gull Lake	2007	65	4.9 ± 3.2	6.2 ± 2.1
North Arm Stephens Lake	2007	61	3.7 ± 2.7	5.0 ± 2.0
Keeyask South Access Road	2006	69	6.3 ± 1.8	8.0 ± 1.7
Keeyask North Access Road	2005	73	2.1 ± 2.2	3.3 ± 1.8
Keeyask South Access Road	2005	62	5.8 ± 3.5	8.1 ± 2.5
Keeyask North Access Road	2004	58	3.2 ± 1.4	4.5 ± 1.8
Wuskwatim Access Road	2002	66	3.6 ± 1.8	3.6 ± 1.9
North Arm Stephens Lake	2006	49	3.7 ± 1.0	5.6 ± 1.6
Keeyask GS*	2003	337	4.9 ± 2.0	6.6 ± 2.6
Keeyask GS*	2002	226	5.8 ± 2.3	7.0 ± 2.4
Wuskwatim GS*	2002	236	4.7 ± 2.1	4.5 ± 2.7
NOTE: * Data for all transects sampled, which were primarily within riparian areas. Source: TetrES 2004a, TetrES 2004b, TetrES 2005				

Table C-5: Species' Densities by Vegetation Community Type in the Regional Study Area LSA vs RSA Sites		
Species	Vegetation Community Type¹	
	Black Spruce (Mixture and Pure Stands)	
	LSA Sites (n=15)	RSA Sites (n=29)
Alder Flycatcher	0.11 ± 0.23	0.21 ± 0.31
American Robin	0.30 ± 0.46	0.18 ± 0.34
Blackpoll Warbler	0.04 ± 0.14	0.12 ± 0.27
Blue-headed Vireo	-	0.02 ± 0.10
Cedar Waxwing	0.04 ± 0.14	0.02 ± 0.10
Chipping Sparrow	0.04 ± 0.14	0.06 ± 0.17
Common Grackle	0.04 ± 0.14	-
Common Redpoll	-	0.02 ± 0.10
Dark-eyed Junco	0.75 ± 0.64	0.35 ± 0.54
Fox Sparrow	0.04 ± 0.14	0.33 ± 0.43
Gray Jay	0.15 ± 0.25	0.16 ± 0.36
Hairy Woodpecker	0.04 ± 0.14	-
Hermit Thrush	0.30 ± 0.35	0.19 ± 0.31
Lincoln's Sparrow	0.04 ± 0.14	0.14 ± 0.28
Magnolia Warbler	-	0.14 ± 0.24
Northern Waterthrush	0.34 ± 0.40	0.23 ± 0.38
Olive-sided Flycatcher	-	0.02 ± 0.10
Orange-crowned Warbler	0.23 ± 0.40	0.25 ± 0.41
Palm Warbler	0.08 ± 0.19	0.21 ± 0.35
Ruby-crowned Kinglet	0.49 ± 0.46	0.19 ± 0.34
Rusty Blackbird	0.04 ± 0.14	0.06 ± 0.23
Solitary Sandpiper	0.04 ± 0.14	0.04 ± 0.14
Spotted Sandpiper	-	0.02 ± 0.10
Swainson's Thrush	0.11 ± 0.23	0.16 ± 0.36
Swamp Sparrow	0.34 ± 0.61	0.29 ± 0.57
Tennessee Warbler	0.23 ± 0.28	0.37 ± 0.43
White-throated Sparrow	0.23 ± 0.45	0.39 ± 0.52
Wilson's Snipe	0.04 ± 0.14	-
Wilson's Warbler	0.04 ± 0.14	0.17 ± 0.26
Winter Wren	0.08 ± 0.19	-
Yellow Warbler	-	0.06 ± 0.17
Yellow-bellied Flycatcher	0.11 ± 0.23	0.20 ± 0.31
Yellow-rumped Warbler	0.30 ± 0.35	0.31 ± 0.41

NOTE:
¹Vegetation community types with three point count stops or fewer are not included in this table and not utilized in habitat analysis.

APPENDIX D

RECORDING UNIT DATA

Table D-1 Auditory Recordings of Species at Risk Detected within the Local and Regional Study Areas (2012)			
Date	Easting	Northing	Species at Risk Detected
26-Jun	344755	6254070	Common Nighthawk (2)
27-Jun	355278	6250589	Common Nighthawk
27-Jun	344755	6254069	Olive-sided Flycatcher
27-Jun to 28-Jun	352718	6253153	Common Nighthawk Olive-sided Flycatcher
30-Jun to 1-Jul	362147	6246419	None identified
1-Jul	344903	6250503	Olive-sided Flycatcher
1-Jul	354308	6253122	Rusty Blackbird Common Nighthawk
1-Jul to 2-Jul	363378	6244510	Common Nighthawk (2) Rusty Blackbird Olive-sided Flycatcher
2-Jul	359708	6244363	Common Nighthawk (2)
2-Jul to 3-Jul	354633	6241602	Common Nighthawk (2) Olive-sided Flycatcher

APPENDIX E

OTHER WILDLIFE DATA

Table E-1			
Other Wildlife Observations During 2012 Surveys			
Keyask Infrastructure Project Regional Study Area			
Date	Easting	Northing	Wildlife Observed
Mammals			
11-Apr-12	389354	6245159	Wolves (heard)
25-Jun-12	341479	6256114	Red Squirrel
26-Jun-12	342595	6254930	Red Squirrel
26-Jun-12	342880	6254769	Red Squirrel
26-Jun-12	343628	6255775	American Marten
26-Jun-12	346520	6261834	Red Squirrel
26-Jun-12	343628	6255775	Red Squirrel
26-Jun-12	342945	6254752	Red Squirrel
28-Jun-12	351749	6253378	Red Squirrel
29-Jun-12	350912	6257308	Red Squirrel
29-Jun-12	351405	6257524	Red Squirrel
Amphibians			
25-Jun-12	341800	6256374	Boreal Chorus Frog
26-Jun-12	344755	6254069	Boreal Chorus Frog; Wood Frog
27-Jun-12	355278	6250589	Boreal Chorus Frog
30-Jun-12	362147	6246419	Boreal Chorus Frog
30-Jun-12	359890	6244281	Wood Frog
Birds¹			
25-Jun-12	348771	6262904	Blackpoll Warbler
25-Jun-12	341277	6257153	Common Redpoll
25-June-12	346829	6261895	Herring Gull
26-Jun-12	343922	6255364	Olive-sided flycatcher
26-Jun-12	343922	6255364	Sora
26-Jun-12	343922	6255364	Belted Kingfisher
26-Jun-12	343915	6255667	Wilson's Snipe
26-Jun-12	343915	6255667	Solitary Sandpiper
26-Jun-12	343915	6255667	Olive-sided flycatcher
26-Jun-12	346443	6262142	Magnolia Warbler
26-Jun-12	343628	6255775	Yellow-rumped Warbler
26-Jun-12	342945	6254752	Olive-sided Flycatcher
26-Jun-12	342945	6254752	Golden-crowned Kinglet
27-Jun-12	358151	6251401	Northern Flicker

Table E-1 Other Wildlife Observations During 2012 Surveys Keyask Infrastructure Project Regional Study Area			
Date	Easting	Northing	Wildlife Observed
27-Jun-12	360348	6250211	Sandhill Crane
27-Jun-12	357778	6251581	Killdeer
28-Jun-12	349016	6254334	Greater Scaup
28-Jun-12	349016	6254334	Red-necked Grebe (x2)
28-Jun-12	351452	6253707	Hermit Thrush
28-Jun-12	351452	6253707	Northern Flicker
28-Jun-12	348717	6254366	Rusty Blackbird
28-Jun-12	351452	6253394	Northern Flicker
29-Jun-12	350913	6257307	Common Grackle
29-Jun-12	350913	6257307	Great Horned Owl
30-Jun-12	346751	6251497	Olive-sided Flycatcher
30-Jun-12	346575	6251258	Olive-sided Flycatcher
30-Jun-12	346727	6251000	Male Spruce Grouse
30-Jun-12	346727	6251000	White-winged Scoters (x2)
30-Jun-12	344913	6250297	Common Tern (x2)
30-Jun-12	344913	6250297	Wilson's Snipe
30-Jun-12	344913	6250297	Sora
30-Jun-12	360201	6244245	Olive-sided Flycatcher
1-Jul-12	354274	6253162	Olive-sided Flycatcher
1-Jul-12	354274	6253162	Winter Wren
1-Jul-12	356686	6252802	Olive-sided Flycatcher
1-Jul-12	356686	6252802	Rusty Blackbird
1-Jul-12	357384	6252768	Red-winged Blackbird
1-Jul-12	363530	6250560	Solitary Sandpiper
1-Jul-12	363692	6250265	Belted Kingfisher
1-Jul-12	363692	6250265	Yellow Warbler
2-Jul-12	355060	6248356	American Crow
2-Jul-12	354784	6248600	Solitary Sandpiper
2-Jul-12	354470	6248613	Rusty Blackbird
2-Jul-12	357673	6250777	Bohemian Waxwing
2-Jul-12	357554	6251047	Rusty Blackbird (female)
2-Jul-12	357266	6251124	Lincoln's Sparrow

Table E-1			
Other Wildlife Observations During 2012 Surveys			
Keyask Infrastructure Project Regional Study Area			
Date	Easting	Northing	Wildlife Observed
2-Jul-12	357266	6251124	Bohemian Waxwing
¹ Incidental bird species observed after end of point count survey or while travelling between survey points			

APPENDIX F

WEATHER CONDITIONS

Table F-1: Weather Observations During 2012 Surveys

Date	Survey Type	Weather Range During Survey Period
10-Apr-12	Nocturnal Owl	-9°C; calm; clear
11-Apr-12	Nocturnal Owl	-8°C; 5 km/hr northwesterly wind; clear
12-Apr-12	Nocturnal Owl	4°C; 15 - 20 km/hr northwesterly wind; clear
25-Jun-12	Breeding Bird	13 - 17°C; calm - 5 km/hr westerly wind; 60 - 100% cloud cover
26-Jun-12	Breeding Bird	12 - 21°C; calm; clear - 100% cloud cover
27-Jun-12	Breeding Bird	16 - 18°C; calm - 10 km/hr southerly wind; 10 - 100% cloud cover
28-Jun-12	Breeding Bird	15 - 20°C; calm; 20 - 100% cloud cover
29-Jun-12	Breeding Bird	15°C; calm - 20 km/hr northwesterly wind; 100% cloud cover; occasional rain
30-Jun-12	Breeding Bird	16 - 18°C; calm - 10 km/hr northwesterly wind; 10 - 30% cloud cover
1-Jul-12	Breeding Bird	15 - 18°C; 10 km/hr northeasterly wind; clear
2-Jul-12	Breeding Bird	12°C; 5 - 10 km/hr easterly wind; 30 - 40% cloud cover