Keeyask Transmission Project
Avian Technical Report

OCTOBER 2012

KEEYASK TRANSMISSION PROJECT

AVIAN TECHNICAL REPORT

PREFACE

The following is one of several technical reports for Manitoba Hydro's application for environmental licensing of the Keeyask Transmission Project. This technical report has been prepared by an independent technical discipline specialist who is a member of the Environmental Assessment Study Team retained to assist in the environmental assessment of the Project. This report provides detailed information and analyses on the related area of study. The key findings outlined in this technical report are integrated into the Keeyask Transmission Environmental Assessment Report.

Each technical report focuses on a particular biophysical or socio-economic subject area and does not attempt to incorporate information or perspectives from other subject areas with the exception of Aboriginal Traditional Knowledge (ATK). Applicable ATK is incorporated where available at time of submission. Most potentially significant issues identified in the various technical reports are generally avoided through the Site Selection and Environmental Assessment (SSEA) process. Any potentially significant effects not avoided in this process are identified in the Environmental Assessment Report along with various mitigation options that would address those potential effects.

While the format of the technical reports varies between each discipline, the reports generally contain the following:

- Methods and procedures.
- Study Area characterization.
- Description and evaluation of alternative routes and infrastructure sites.
- Review of potential effects associated with the preferred transmission routes and station sites.

Following receipt of the required environmental approvals, an Environmental Protection Plan (EnvPP) will be completed and will outline specific mitigation measures to be applied during construction, operation and maintenance of the proposed Keeyask Transmission Project. An EnvPP is typically developed from a balance of each specialist's recommendations and external input.

Each of the technical reports is based on fieldwork and analysis undertaken throughout the various stages of the SSEA process for the Project. The technical reports are as follows:

- Technical Report 1: Aquatics Environment
- Technical Report 2: Terrestrial Habitat, Ecosystems and Plants
- Technical Report 3: Amphibians
- Technical Report 4: Avian

- Technical Report 5: Mammals
- Technical Report 6: Forestry
- Technical Report 7: Socio-economic Environment
- Technical Report 8: Heritage Resources
- Technical Report 9: Tataskweyak Cree Nation Report on Keeyask Transmission Project

The technical reports contain more detail on individual subject areas than is provided in the Environmental Assessment Report. The technical reports have been reviewed by Manitoba Hydro, but the content reflects the opinions of the author. They have not been edited for consistency in format, style and wording with either the Environmental Assessment Report or other technical reports.

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EXECUTIVE SUMMARY

Keeyask HydroPower Limited Partnership is currently proposing to develop a generation station, the Keeyask Generation Project, along the Nelson River at Gull Rapids. As a related component of this potential project, Manitoba Hydro, “the Proponent,” is proposing construction of the Keeyask Transmission Project (the Project). This Project includes the development of a Construction Power line that would convey power between an existing transmission line (KN36) and the site where the Keeyask Generation Station would be built, and separate Generation Outlet Transmission lines that would transfer power generated by the Generation Station to the Radisson Converter Station.

Site Selection and Environmental Assessment (SSEA) studies were conducted to gather information on a variety of wildlife groups, including birds, using the habitats within areas where the proposed transmission line routes are located. Information gained through these bird studies, together with other environmental study results, was used to assist in the route selection process for both the Construction Power and Generation Outlet Transmission Lines.

Three years of field studies were conducted for the Keeyask Transmission Project (2009-2011). Data was collected along the Construction Power and Generation Outlet Transmission Lines alternative routes and in the vicinity of the Radisson Converter and Keeyask Switching Stations. Local knowledge was sought while conducting field surveys and was gathered opportunistically throughout the field and reporting processes. Results of field studies were augmented by information collected during Generation Station studies.

Within the Region, the diverse terrestrial habitats and abundant food sources (e.g., insects, seeds) support several landbird species (i.e., songbirds, woodpeckers, upland game birds, raptors, nighthawks), including resident species (e.g., gray jay (*Perisoreus canadensis*), ruffed grouse (*Bonasa umbellus*), boreal owl (*Aegolius funereus*) that inhabit the Region year-round. Inland lakes, creeks and wetlands provide key breeding habitats for many waterbirds including ducks, shorebirds and sandhill cranes (*Grus canadensis*).

Three species at risk, as designated by the Committee on the Status of Endangered Species in Canada (COSEWIC) and the *Species at Risk Act* (SARA) were observed during field studies for the Project. These were olive-sided flycatcher, rusty blackbird and common nighthawk. As well, four other species (yellow rail, short-eared owl, red knot and peregrine falcon) have the potential to occur in the Study Area.

The two alternative Construction Power Transmission Line routes and the four Generation Outlet Transmission Line routes were surveyed and compared with regard to their potential for effects for all environmental components. The route options with the least potential for negative effects were identified for each component (e.g., birds, mammals, terrestrial habitat, etc.).

The sites for the Construction Power and Switching Stations were selected more for technical consideration, but they had been determined to be similar regarding their potential for effects on birds and other environmental components.

Potential negative effects of the Project were mitigated to the extent feasible by route selection decision making. Where negative effects were still possible, these will be were minimized or eliminated through various mitigation measures. Mitigation measures to be employed included:

- Winter clearing of rights-of-way and station sites to reduce potential for impacts on nesting birds.
- Allowing some regrowth of vegetation along the rights-of-way to provide bird habitat.
- Restriction of hunting by Project workers to reduce negative impacts on migratory and upland gamebirds.
- Avoidance and buffering of large stick nests found in construction areas.

Effects of the Keeyask Transmission Project on bird communities will exist for the life of the Project. These effects will include minor habitat loss at station sites and transmission tower footprints, sensory disturbance during construction activities, a potential for increased foraging and/or nesting opportunities for species which prefer open areas, mortality and increased hunting pressure. However, these effects are expected to be small, and likely not measurable within the range of natural variation of bird populations.

1.0 INTRODUCTION

The Keeyask Transmission Project is required to transmit power, created by the proposed Keeyask Generation Project. Keeyask HydroPower Limited Partnership is currently proposing to develop a generation station, the Keeyask Generation Project, along the Nelson River at Gull Rapids. As a related component of this potential project, Manitoba Hydro, "the Proponent," is proposing construction of the Keeyask Transmission Project ('the Project'). This project includes the development of a Construction Power Transmission Line that would convey power between an existing transmission line (KN36) and the site where the Keeyask Generating Station would be built, and separate generation outlet lines that would transfer power generated by the Generation Station to the Radisson Converter Station (Map 1-1).

In 2009 and through 2011, Site Selection and Environmental Assessment (SSEA) studies were conducted to gather information on a variety of wildlife groups, including birds, using the habitats within areas where the proposed transmission line routes are located. Information gained through these avian studies, together with other environmental study results, was used to assist in the route selection process for both the Construction Power Transmission Line and Generation Outlet Transmission Lines. Ultimately this information will be used in the development of the standalone Keeyask Transmission Project Environmental Assessment Report that will be submitted to Manitoba Conservation and Water Stewardship for licensing approval.

This report provides information gathered in June 2009, 2010 and 2011 on avian communities utilizing various habitats located throughout the areas proposed for transmission line development. Avian abundance and diversity was described for the various habitat types potentially affected by the Project. A route analysis based on habitat data and avian community data was conducted to determine if Construction Power Transmission Line routes and/or Generation Outlet Transmission Line routes differed in terms of their potential to impact high-quality avian habitat.

1.1 PROJECT COMPONENT OVERVIEW

1.1.1 Construction Power Transmission Line and Station

A new Construction Power Transmission Line (138-kV and approximately 22 km long) from the existing 138-kV KN36 transmission line to a new 138-kV to 12.47-kV Construction Power Station to be located north of the proposed Keeyask Generation Station.

The purpose of the Construction Power Transmission Line and Station is to provide power for the construction activities of the Generation Station. After operation, the Construction Power Station will be left in place, as will a portion of the Construction Power Transmission Line, to

provide a contingency function for a “black start”[1] emergency backup to diesel generation units at the Generation Station (Figure 1-1).

1.1.2 Unit Transmission Lines

Four 138-kV AC Unit Transmission lines (KE1 to 4) will transmit power from the seven generators located at the Keeyask Generation Station to the new Keeyask Switching Station. Three lines will be double circuit and one line single circuit to accept power from the seven Generation Station turbines. The four lines, each approximately 4 km long, will be located in a single corridor.

1.1.3 Keeyask Switching Station

A new Keeyask Switching Station will accept power from Generation Station via the four Unit Transmission lines from the Generation Station transformers and transfer that power to three Generation Outlet Transmission lines. The Switching Station will be located on the south side of the Nelson River. The purpose of the Switching Station is to provide the terminal facilities for the electrical connection to the Generation Station, and to provide flexibility for accommodating power transmission from the Generation Station to the Radisson Converter Station (Figure 1-2).

1.1.4 Generation Outlet Transmission Lines

Three 138-kV AC Generation Outlet Transmission (GOT) lines will transmit power from the Keeyask Switching Station to the existing Radisson Converter Station 138-kV AC switchyard. The three lines, each approximately 38 km long, will be located in a single corridor. Manitoba Hydro plans to build one of these Generation Outlet Transmission lines to serve as a backup construction power line during construction and the line will be partially salvaged back to the Keeyask Switching Station and utilized as a Generation Outlet Transmission Line.

1.1.5 Radisson Converter Station Upgrades

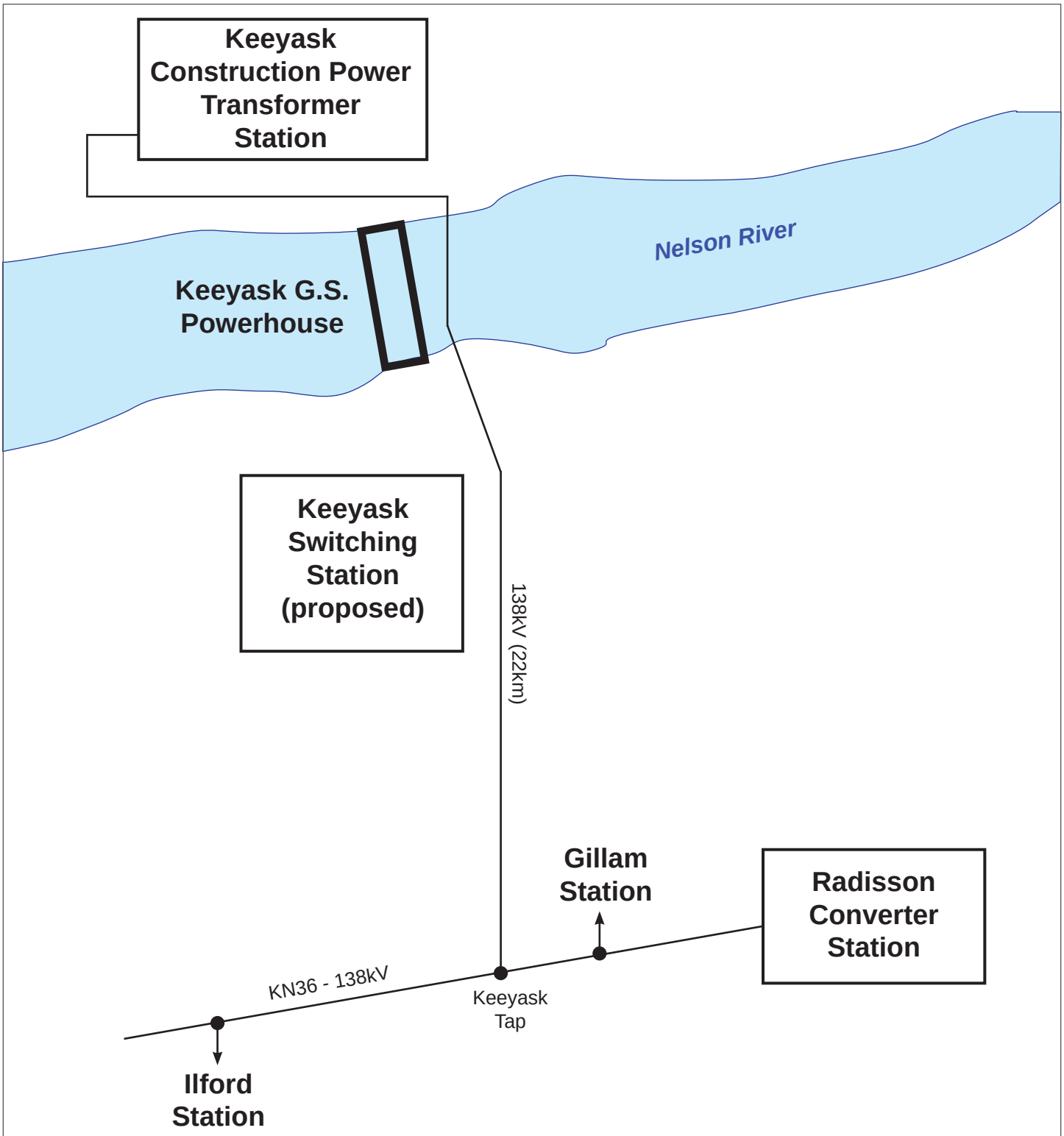
The existing Radisson Converter Station will be upgraded in two stages, as follows:

1. Stage I: Radisson Converter Station will require the addition of a 138-kV breaker to accommodate the initial new 138-kV transmission line KR1 from Keeyask Switching Station.

2. Stage II: Station equipment will include the addition of a 138-kV bay (Bay 1) complete with four 138-kV breakers and associated equipment for the termination of two additional lines (KR2 and KR3) from Keeyask Switching Station. KR2 and KR3 will enter the west side of the station utilizing dead-ended steel structure with line switches. The KR2 and KR3 lines will

[1] Black start is the process of restoring a power station to operation without relying on the external electric power transmission network or grid.

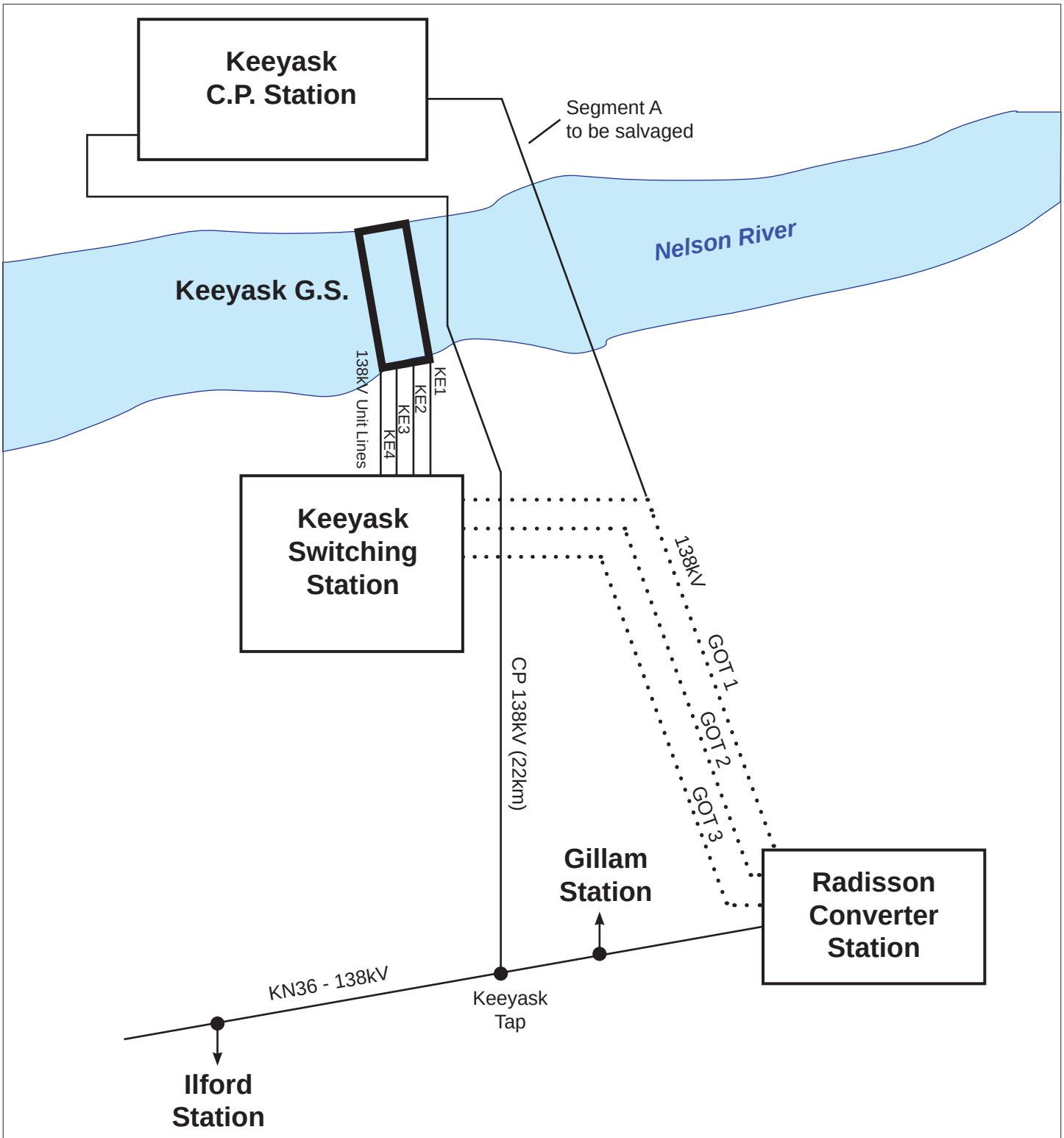
proceed underground around the station and finally terminate to Bay 1. This is done to avoid complex line crossings into the station. Thirty-one 138-kV AC breakers will also need to be replaced due to fault levels exceeding existing breaker ratings.



Notes:

- Construction power line & transformer station required to provide power to construction site.
- Construction power line remains in service to serve as “black start” during operations.
- Part of transformer station is decommissioned after construction.

Figure 1-1. Schematic of Proposed Construction Power (CP)

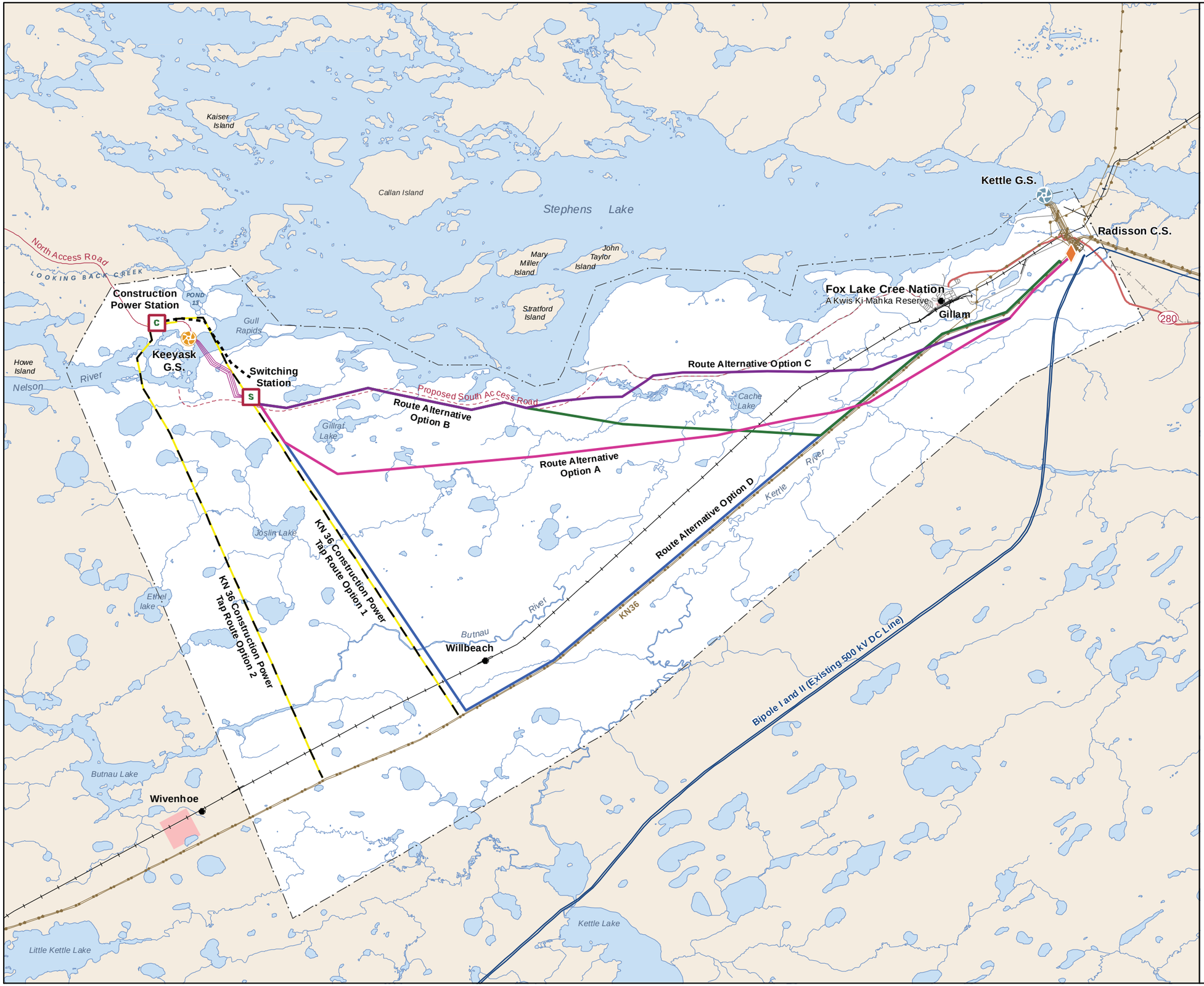


Notes:

- Generation outlet transmission lines & switching station are required to deliver power from Keeyask to Radisson Converter Station.
- GOT 1 is built at start of construction to act as backup to CP line.
- A segment of GOT 1 (Segment A) is salvaged after construction & GOT 1 is re-terminated at SS.

G:_GIS_Project_Folder\00_Hydro\111420007_Kysk_Outlet_TransmissionInDesign/Construction_Pwr_Schematic

Figure 1-2. Schematic of Proposed Generation Outlet Transmission (GOT)



Manitoba Hydro

Keeyask Transmission Project

Project Infrastructure

- Route Alternative Option A
- Route Alternative Option B
- Route Alternative Option C
- Route Alternative Option D
- Construction Power Line (KN36) Option 1 and 2
- Construction Power Line (Temporary)
- Unit Lines
- Construction Power Station
- Switching Station
- Project Study Area

Infrastructure

- Converter Station
- Generating Station (Proposed)
- Generating Station
- Bipole I and II (Existing 500 kV DC Line)
- Transmission Line
- North Access Road
- Proposed Access Road

Landbase

- Community
- Provincial Road
- Municipal Road
- Active Railway
- Abandoned Railway
- Watercourse
- Waterbody
- First Nation

Coordinate System: UTM Zone 15N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: Monday, September 24, 2012

N

0 2 4 Kilometres
0 2 4 Miles

1:150,000

Project Infrastructure

Alternative Transmission Line Routes

Map 1-1

2.0 METHODS AND PROCEDURES

2.1 STUDY AREA DEFINITION

The Project Study Area (illustrated in Map 1-1) is located in northern Manitoba, extending from the Radisson Converter Station (about 6 km northeast of the town of Gillam), along the south shore of Stephens Lake, to the proposed Keeyask Generation Project. From this juncture, the Project Study Area extends north across the Nelson River approximately 4 km, and southward to a point about 3 km south of Manitoba Hydro transmission line KN36 – 138-kV. The southern boundary extends east back to the Radisson Converter Station and parallel to KN36.

The Project is located in the Split Lake Resource Management Area, which includes the town of Gillam, about 300 km northeast of Thompson, Manitoba. The area is utilized by resources users from Tataskweyak Cree Nation (Split Lake) and Fox Lake Cree Nation (Gillam/Bird).

The Project Study Area occurs within a Region shown in Map 2-1. Descriptions of the Region in the EA Report are intended to put into context the potential effects and characteristic of the Study Area. The region for the Keeyask Transmission Project coincides with the regional study area defined in the terrestrial environment assessed for the Keeyask Generation Project data collection.

2.2 DATA COLLECTION AND ANALYSIS

2.2.1 Overview of Information Sources and Data

A review of pertinent literature, including field reports from Keeyask Generation Project studies was conducted to guide field studies and interpret information gathered during the three years of surveys. Local knowledge was sought while conducting field surveys and was gathered opportunistically throughout the field and reporting processes.

Three years of field studies conducted for the Keeyask Transmission Project (2009-2011). Data was collected along the Construction Power and Generation Outlet Transmission lines proposed routes and in the vicinity of the converter and switching stations. While studies were not undertaken along the Unit Transmission Line routes, this area had been previously surveyed during studies for the Keeyask Generation Project.

In addition to the data collected for the Keeyask Transmission Project, the study team utilized data collected for the Keeyask Generation Project and Keeyask Infrastructure Project as a comparison/confirmation dataset.

2.2.2 Breeding-Bird Surveys

Breeding-bird surveys were initially conducted in the Project Study Area from June 14 to June 23, 2009. Survey efforts included investigations of 20 transects, containing a total of 193 stops situated among various habitat types located along the Construction Power and Generation Outlet Transmission Line route options (Map 2-2). To strengthen the understanding of bird communities observed in the Project Study Area in 2009, a second year of surveys was conducted between June 9 and 20, 2010. With the exception of one survey stop, all 20 transects surveyed in 2009 (total of 192 stops) were resurveyed during this period. In 2011, additional surveys were conducted from June 13 to 16 to investigate bird utilization of habitat at recently selected preliminary switching station locations and to further contribute to the overall bird survey dataset for the Project Study Area. Seventeen transects, totaling 105 point-count stops, were surveyed in 2011 (Map 2-2).

At the time of the 2009 to 2011 bird surveys, Manitoba Hydro had identified two route options (Routes 1 and 2) for the Construction Power Transmission Line, and three alternative route options (Routes A, B, and C) for the Generation Outlet Transmission lines (Map 2-2). In 2009 and 2010, 11 transects totaling 108 point-count stops were surveyed along and adjacent to the two Construction Power Transmission Line route options (Map 2-2). Nine transects totaling 85 point-count stops (84 point-count stops in 2010) were surveyed along and adjacent to the three Generation Outlet Transmission Line route options (Map 2-2). In 2011, surveys took place on 14 transects along and adjacent to the Generation Outlet Transmission Line route options (8 transects; 48 point-count stops) and Construction Power Transmission Line (6 transects; 48 point-count stops) route options. Additionally, three new transects (totaling 9 point-count stops) associated with the preliminary switching station locations were also surveyed in 2011. Generation Outlet Transmission Line Route D was added as an option after all field studies occurred. However, this route is expected to be similar to Route A with respect to bird habitat and bird populations as they are both well removed from Stephens Lake and traverse similar habitats.

Transect locations were selected using a combination of topographic mapping, ECOSTEM Ltd. habitat classification mapping (ECOSTEM Ltd. 2009) and pre-survey aerial flights of the proposed routes. An integrated evaluation of this information helped to identify locations of representative cover types for sampling. While this information assisted in determining location of sampling efforts, further classification of breeding bird habitat was conducted at each survey stop visited (Table 2-1).

Surveys for breeding terrestrial birds (e.g., songbirds) coincided with their peak breeding season in early to mid-June. Methods utilized for breeding-bird surveys were consistent with Canadian and US standard procedures for conducting population surveys using the Point Count Method (Ralph *et al.* 1993; Welsh 1993). Breeding-bird surveys occurred during the peak bird singing

hours of 05:00-10:00h. Point-count survey stops were located at 150-m intervals along a set transect of variable length. At each survey stop, biologists and a First Nations assistant allowed a few minutes to pass prior to proceeding with the three-minute sample period; this allowed birds to return to normal behaviour prior to sampling beginning. 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 recorded but excluded from analysis, and care was taken to avoid double-counting birds at each stop. A second biologist recorded a description of habitat, including canopy cover, understory and ground cover at each survey stop. All other wildlife observed during surveys was recorded as reconnaissance observations. First Nations assistants were from Keeyask Cree Nation communities and provided valuable local knowledge to the biologists.

Analysis of bird survey data was carried out for each habitat/broad vegetation type surveyed (Map 2-3). Broad vegetation type classifications are defined by the leading tree species present and the degree of mixture of that species with other vegetation types. Habitat types comprising the Project Study Area were classified by ECOSTEM Ltd. (Terrestrial Habitat, Ecosystems and Plants Technical Report 2012) and descriptions of each habitat classification is provided in Tables 2-1 and 2-2. For each broad vegetation type, bird diversity was determined by averaging the number of species observed per stop while bird density was determined using the total number of birds observed divided by total area surveyed (in hectares). When Generation Outlet Transmission Line Route D was added to the options being considered, habitat data was not available for much of Option D. As a result, Route D is not included in Table 2-2. In order to characterize Route D in relation to the other Generation Outlet Transmission Line options, recent data from the Habitat Technical Report (Terrestrial Habitat, Ecosystems and Plants Technical Report 2012) was added (Table 2-3). This data demonstrates that Generation Outlet Transmission options A and D are similar with respect to terrestrial habitats traversed.

Results of breeding bird surveys conducted in the Keeyask Generation Project Study Area between 2001 and 2007 were used as regional comparative values for the survey data collected in the Project Study Area between 2009 and 2011.

Table 2-1: Dominant Broad Vegetation Types Along Construction Power Transmission Line Route Options

Broad Vegetation Type	Route 1		Route 2	
	Area (ha) of a 60-m ROW	% of Total Area	Area (ha) of a 60-m ROW	% of Total Area
Black Spruce Pure	79.5	68.0%	66.9	54.0%
Low Vegetation	18.0	15.4%	36.7	29.6%

Table 2-1: Dominant Broad Vegetation Types Along Construction Power Transmission Line Route Options

Broad Vegetation Type	Route 1		Route 2	
	Area (ha) of a 60-m ROW	% of Total Area	Area (ha) of a 60-m ROW	% of Total Area
Young Regeneration	3.5	3.0%	6.8	5.5%
Tamarack Mixture	3.4	2.9%	3.2	2.5%
Black Spruce Mixture	2.6	2.2%	2.8	2.3%
Tamarack Pure	2.3	1.9%	-	-
Other (Including Water)	7.6	6.5%	762.8%	6.2%
Total	**117**	**100%**	**124**	**100%**

Table 2-2: Dominant Broad Vegetation Types Along Generation Outlet Transmission Line Route Options

Broad Vegetation Type	Route A		Route B		Route C	
	Area (ha) of a 60-m ROW	% of Total Area	Area (ha) of a 60-m ROW	% of Total Area	Area (ha) of a 60-m ROW	% of Total Area
Black Spruce Pure	380.64	56.7%	353.90	54.0%	433.45	66.8%
Low Vegetation	126.46	18.8%	128.49	19.6%	47.90	7.4%
Tamarack Mixture	14.55	2.2%	20.39	3.1%	19.38	3.0%
Black Spruce Mixture	9.78	1.5%	16.92	2.6%	17.44	2.7%
Jack Pine Mixture	8.90	1.3%	3.58	0.5%	7.47	1.2%
Young Regeneration	8.64	1.3%	8.64	1.3%	8.64	1.3%
Human	4.67	0.7%	4.40	0.7%	8.81	1.4%
Tall Shrub	4.58	0.7%	3.45	0.5%	2.54	0.4%
Other (Including Water)	113.2	16.9%	115.4	17.6%	103.0	15.9%
Total	**671**	**100%**	**655**	**100%**	**649**	**100%**

Table 2-3: Habitat Compositions of the Alternative Generation Outlet Route Options

Habitat Type*	Option A		Option B		Option C		Option D**	
	Total Area (ha)	% of Total Area	Total Area (ha)	% of Total Area	Total Area (ha)	% of Total Area	Total Area (ha)	% of Total Area
Black Spruce Dominant	995	64.9	923	62.2	1110	77.1	634	68.7
Black Spruce Mixedwood	47	3.1	56	3.8	77	5.3	49	5.3
Jack Pine Dominant	42	2.7	34	2.3	35	2.4	56	6.1
Jack Pine Mixedwood	17	1.1	12	0.8	15	1.0	9	1.0
Low Vegetation	336	21.9	352	23.7	129	9.0	107	11.6
Tall Shrub	12	0.8	12	0.8	7	0.5	6	0.7
Tamarack Dominant	10	0.7	12	0.8	4	0.3	5	0.5
Tamarack Mixedwood	62	4.0	68	4.6	54	3.8	33	3.6
Trembling Aspen Dominant	11	0.7	11	0.7	6	0.4	11	1.2
Trembling Aspen Mixedwood	2	0.1	3	0.2	3	0.2	13	1.4
Total area (ha)	*1534*		*1483*		*1440*		*923***	

**See Keeyask Hydropower Limited Partnership (2012b) for a description of the land cover and habitat types.*

***Based on terrestrial habitat mapping for 52% of the area in corridor for Option D, plus 11 ha of priority habitat identified in the unmapped areas.*

2.2.3 Aerial Surveys

Reconnaissance-based helicopter bird surveys were conducted during spring, summer and fall of 2009, to gain a general understanding of waterbird usage of inland lakes, rivers and creeks in the Project Study Area. Helicopter surveys of the two alternative Construction Power Transmission Line route options were conducted on May 25, June 20, and September 21, 2009. A predetermined flight path was followed for May and June surveys (Map 2-4). This flight path consisted of four survey routes that covered the proposed Construction Power Transmission Line route options and adjacent areas (Map 2-4). In September, a reconnaissance helicopter survey focused on determining the degree to which waterbirds used small inland lakes as staging areas during fall migration. In May 2009, at the time of the first Construction Power helicopter survey, alternative route options for the Generation Outlet Transmission lines had not yet been established by Manitoba Hydro and therefore, May helicopter surveys of this area were not conducted. June aerial surveys of the alternative Generation Outlet Transmission Line routes were carried out on June 24, 2009. The flight path of this survey generally followed the route options initially proposed in June 2009, as shown in Map 2-4.

The helicopter-based bird survey procedures for both Construction Power and Generation Outlet Transmission Line surveys were as follows:

- Flights were conducted at approximately 80 km/hr at an altitude of approximately 60 m.
- Two primary observers were positioned on opposite sides of the helicopter and recorded all large-bodied birds (e.g., waterbirds and raptors), and other wildlife, within 200 m of the helicopter.
- A third person served as a secondary observer and informed primary observers of any additional wildlife sightings.
- A GPS-time stamped track was recorded for the duration of each survey. Times (including hour, minute, second) of all bird and other wildlife observations were manually recorded by one observer; this allowed for later retrieval of UTM coordinates for each observation made during the aerial survey.
- Large inland lakes encountered along the survey routes were fully circled by the helicopter to observe all areas of the waterbody.
- Number and species of birds along with other observed wildlife were recorded on data sheets.
- Acronyms were used for birds to abbreviate writing time and optimize observation time.
- Unidentifiable shorebirds were categorized as small, medium or large.

- Pertinent observations regarding habitat features (e.g., small eskers, burns) along the survey route were also recorded.

2.3 VALUED ENVIRONMENTAL COMPONENT SELECTION

Valued Environmental Components (VECs) are components of the biological or socio-economic environment that may be affected by the Project. VECs are species and/or environmental components that are used to highlight or focus an environmental assessment. Defined as elements of the environment having scientific, social, cultural, economic, historical, archaeological or aesthetic importance, VECs are proposed and identified and described under each environmental component. VECs are typically selected on the basis of their importance or relevance to stakeholders (e.g., species such as moose that are hunted) and/or as indicators of environmental effects to a broader range of animals. VECs are typically determined with the input from regulators and stakeholders, Aboriginal people and discipline experts, as well as literature reviews and experience with other projects. Environmental indicators and measurable parameters or variables are identified and described for each VEC. The same indicators and parameters/variables are used to describe environmental effects and residual environmental effects, and to monitor changes or trends over time during the Project construction and operation/maintenance phases.

The Keeyask Transmission Project selected VECs that were identified as being important or valued by members of the study team (e.g., species that are protected) and/or by the public and by other elements of the SSEA process. The identified VECs facilitated assessment of the interactions between the Project components and specific valued components of the environment.

The selection and use of VECs are intended to permit the analyses to be fairly consistent with the Bipole III Transmission Project and Keeyask Generation Project. Since the Keeyask Transmission and Generation Projects are occurring in the same region, factors influencing the different components are similar and therefore it is likely feasible to use many of the same VECs, particularly those that are potentially affected by transmission projects.

Raptors, a bird group, olive-sided flycatcher, rusty blackbird and common nighthawk were selected as bird VECs for the Keeyask Transmission Project. They are discussed in Section 3.2.5.

2.4 METHODOLOGY FOR EVALUATING ALTERNATIVE ROUTES AND INFRASTRUCTURE

2.4.1 Construction Power Transmission Lines

Factors considered when evaluating the Construction Power Transmission lines with respect to avian communities and their habitat included:

- Line length: Generally it is considered that the shorter the line, the less potential that impacts will occur.
- Number of stream crossings: In the study area, stream crossings are usually more sensitive sites that support higher-quality habitat for birds and other wildlife therefore reducing the number of stream crossings is desirable.
- Proximity to wetlands and lakes: Wetlands and lakes provide habitat for waterbirds, shorebirds and other wildlife. Generally, it is ideal to minimize the number of wetlands and lakes crossed by or in proximity to transmission lines.
- Presence of terrestrial avian habitat: Forest habitat along the two routes was compared to determine if any significant differences occurred, e.g., the presence of a contiguously treed upland ridge (which is not common in the area). The bird habitats traversed by both lines were calculated and used in comparing the two routes (Tables 2-1 to 2-3).
- Habitat structure/fragmentation: The presence of transmission lines will contribute to habitat fragmentation in the Project Study Area. Alignment of the Construction Power Transmission lines need to consider other features in the area that already contribute to habitat fragmentation.

Utilizing these factors, Route Options 1 and 2 were evaluated with information from a desktop aerial photo interpretation analysis, results from Project field surveys and data collected for Keeyask Generation Project studies.

2.4.2 Construction Power Station

Factors considered when siting the Construction Power Station a primarily technical in nature. A preliminary environmental assessment of siting options was done prior to the determination of the preferred site.

Within the Study Area, five alternative Construction Power Station sites (CP Sites 2-6) were identified. Due to the new access road alignment from PR 280 to the Keeyask Generation Station site, four of the five sites (CP Sites 2, 3, 4 and 5) were ruled out as the access road would go through the center of these proposed sites.

A desktop photo analysis and examination of data collected for Keeyask Generation Project studies was undertaken, to assess all optional sites with regards to the potential for substantive negative effects on birds.

2.4.3 Generation Outlet Transmission Line

The factors considered with respect to birds when siting the Generation Outlet Transmission included:

- Line length: Generally it was considered that the shorter the line length, the better, as there would be less potential for negative impacts to occur.
- Number of stream crossings: In the Project Study Area, stream crossings are usually more sensitive sites that support higher-quality habitat for birds and other wildlife. Reducing the number of stream crossings is desirable.
- Proximity to wetlands and lakes: Wetlands and lakes provide habitat for waterbirds, shorebirds and other wildlife. Generally, it is more desirable to have transmission lines pass close to as few of these features as possible.
- Proximity to Stephens Lake: Generally, from a bird-habitat perspective, riparian habitat is judged to be of high quality compared with habitat located further away from a lake, stream or wetland. In the Project Study Area, riparian habitat along Stephens Lake is a notable feature. Generation Outlet Transmission Line routes need to consider proximity to Stephen's Lake as there is potential for staging waterfowl to utilize Stephens Lake, which could result in increased bird/line collision risk.
- Presence of terrestrial avian habitat: The forest habitat along the four routes was compared to determine if any significant differences occurred, e.g., the presence of a contiguously treed upland ridge (which is not common in the area). The habitats traversed by Generation Outlet Transmission lines were calculated and used in comparing the two routes (Tables 2-1 to 2-3).
- Habitat structure/fragmentation: The presence of transmission lines will contribute to habitat fragmentation in the area. The alignment of the Generation Outlet Transmission Lines needs to consider other features in the area that already contribute to habitat fragmentation. Of particular importance in the Project Study Area are the proposed South Access Road route, the Butnau Road and the right-of-way for the KN36 transmission line. The Hudson Bay Railway and the Bipole I and II transmission line rights-of-way also traverse the Project Study Area. Siting of the Generation Outlet Transmission right-of-way in combination with features already present on the landscape to increase habitat fragmentation needs to be considered.

Generation Outlet Transmission Line route options were evaluated in reference to these factors utilizing results from Project breeding bird and reconnaissance based helicopter surveys,

desktop aerial photo interpretation and examination of data collected for Keeyask Generation Project studies in the region.

2.4.4 Unit Transmission Lines

Factors utilized for evaluating the Unit Transmission Line routes were terrestrial habitat types crossed and the presence of significant wetland areas adjacent to the routes. Consideration of the potential for negative effects on birds was undertaken utilizing aerial photography and habitat classifications provided by ECOSTEM (Terrestrial Habitat, Ecosystems and Plants Technical Report 2012).

2.4.5 Keeyask Switching Station

The factors considered from a bird perspective when siting the Keeyask Switching Station included:

- Length of transmission lines required.
- Proximity to/conflicts with Keeyask Generation Station components.
- Technical considerations.

These factors were incorporated into Switching Station siting utilizing results from Project breeding bird surveys, desktop aerial photo interpretation and examination of data collected for Keeyask Generation Project studies in the region.

2.4.6 Radisson Converter Station Upgrade

Proposed upgrades to the Radisson Converter Station necessary to accommodate the power delivered from the Keeyask Generation Project will be confined to the existing footprint of the Radisson Converter Station. Consequently, there are no specific siting evaluations necessary for this Project component.

2.5 EFFECTS ASSESSMENT AND MITIGATION MEASURES

The environmental assessment involved identifying and analyzing potential effects associated with the preferred routes that could not be avoided during the route selection process. During the route selection process, detailed socio-economic and biophysical studies were conducted to determine potential effects more precisely. Potential effects and mitigation measures are detailed in Chapter 7 of the Environmental Assessment Report. Appropriate mitigation

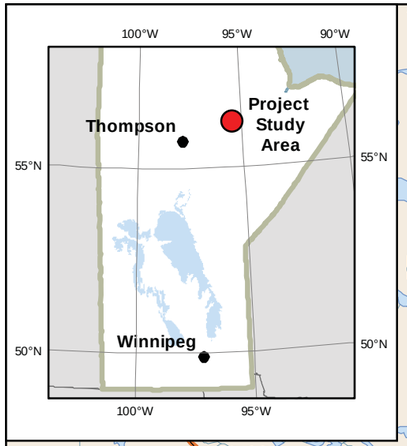
measures have been identified to reduce potential negative effects during all phases of Project development.

2.5.1 Residual Effects Significance Evaluation

Residual effects are the actual or anticipated Project effects that remain after considering mitigation and the combined effects of other past and existing developments and activities. Each potential effect on a VEC is initially evaluated using the following criteria:

- Direction or nature (i.e., positive, neutral or adverse) of the effect.
- Magnitude (i.e., severity) of the effect.
- Duration (temporal boundaries).
- Geographic Extent (spatial boundaries).

The definitions for the above are provided in Chapter 3 of the Environmental Assessment Report.



Nelson House RMA

Split Lake RMA

York Factory RMA

Fox Lake RMA

Cross Lake Registered Trapline Zone

Stephen's Lake

Split Lake

Nelson River

Tataskweyak Cree Nation

York Factory First Nation

War Lake First Nation

Fox Lake Cree Nation

Fox Lake Cree Nation A Kwis Ki Mahka Reserve

Bunibonibee Cree Nation

Manto

Sipiwesk Lake

Keeyask G.S.

Kettle G.S.

Gillam

Radisson C.S.

Long Spruce G.S.

Henday C.S.

Limestone G.S.

Fox Lake (Bird)

Kelsey G.S.

York Landing

Ilford

Thompson

Pikwitonei

Thicket Portage

KN36

280

290

6

Bipole I and II (Existing 500 kV DC Line)

Keeyask Transmission Project Study Area

Manitoba Hydro

Keeyask Transmission Project

Project Infrastructure
- Project Study Area

Infrastructure
- Converter Station
- Generating Station (Proposed)
- Generating Station
- Bipole I and II (Existing 500 kV DC Line)
- Transmission Line

Landbase
- Community
- Provincial Highway
- Provincial Road
- Active Railway
- Abandoned Railway
- Resource Management Area
- First Nation
- Watercourse
- Waterbody

Coordinate System: UTM Zone 15N NAD83
Data Source: MBHydro, Stantec, ProvMB, NRCAN
Date Created: September 26, 2012

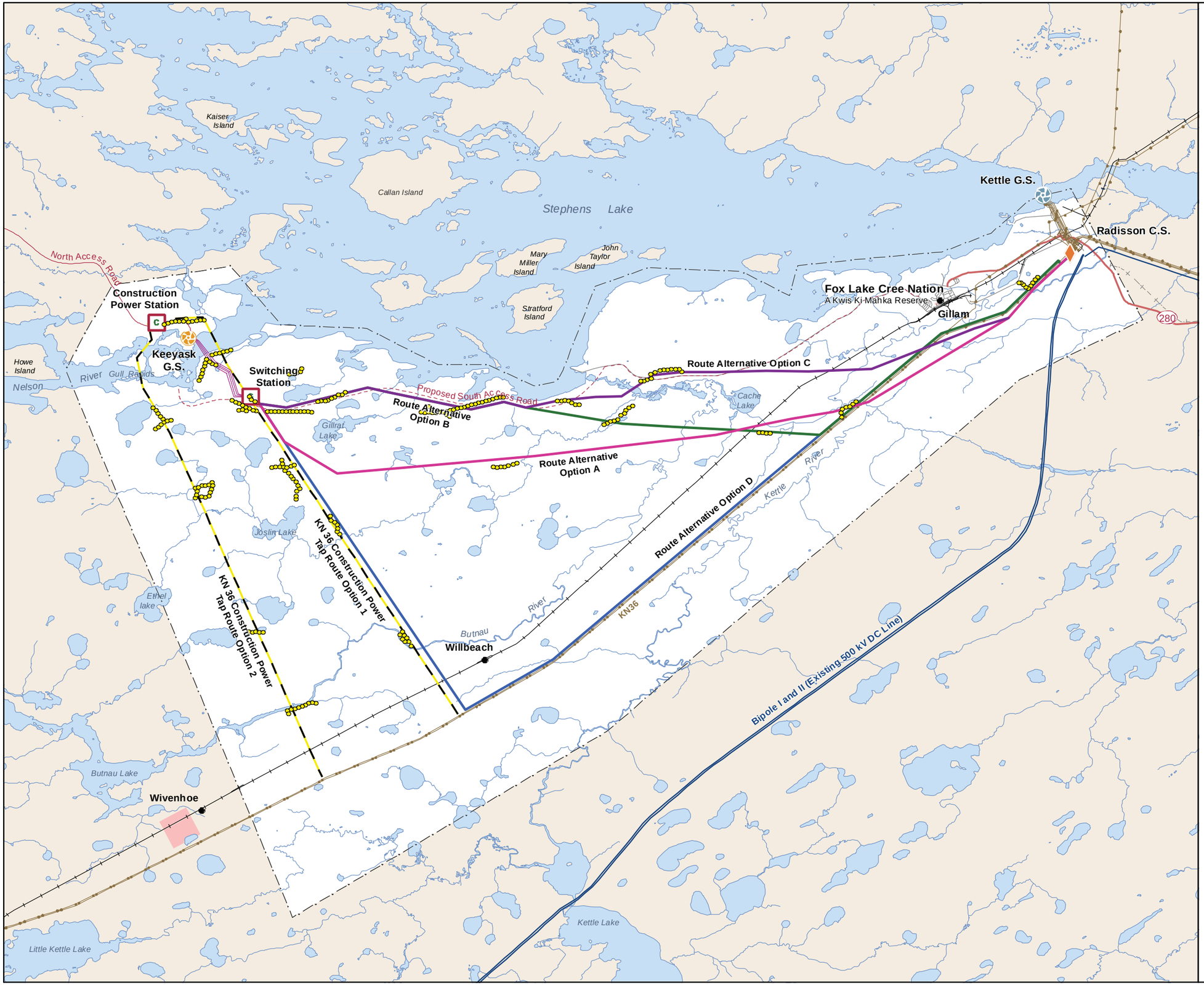
N

0 10 20 Kilometres
0 10 20 Miles

1:1,000,000

Project Study Area in Northern Manitoba

Map 2-1



Manitoba Hydro

Keeyask Transmission Project

Project Infrastructure

- Route Alternative Option A
- Route Alternative Option B
- Route Alternative Option C
- Route Alternative Option D
- Construction Power Line (KN36) Option 1 and 2
- Unit Lines
- Construction Power Station
- Switching Station
- Project Study Area

Infrastructure

- Converter Station
- Generating Station (Proposed)
- Generating Station
- Bipole I and II (Existing 500 kV DC Line)
- Transmission Line
- North Access Road
- Proposed Access Road

Avian

- Breeding Bird Survey Stops

Landbase

- Community
- Provincial Road
- Municipal Road
- Active Railway
- Abandoned Railway
- Watercourse
- Waterbody

Coordinate System: UTM Zone 15N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: Tuesday, October 09, 2012

N

0 2 4 Kilometres
0 2 4 Miles

1:150,000

Breeding Bird Survey Location in Project Study Area 2009 - 2011

Map 2-2

Manitoba Hydro

Keeyask Transmission Project

Project Infrastructure

- Route Alternative Option A
- Route Alternative Option B
- Route Alternative Option C
- Route Alternative Option D
- Construction Power Line (KN36) Option 1 and 2
- Unit Lines
- Construction Power Station
- Switching Station
- Project Study Area

Infrastructure

- Converter Station
- Generating Station (Proposed)
- Generating Station
- Bipole I and II (Existing 500 kV DC Line)
- Transmission Line
- North Access Road
- Proposed Access Road

Broad Vegetation Types

- BS Mixedwood
- BS Mixture
- BS Pure
- Human
- JP Mixture
- JP Pure
- Low Vegetation
- TL Mixture
- Tall Shrub
- Young Regeneration
- Other Vegetation Types
- Water

Landbase

- Community
- Provincial Road
- Municipal Road
- Active Railway
- Abandoned Railway
- Watercourse
- Waterbody

Coordinate System: UTM Zone 15N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: Tuesday, October 09, 2012

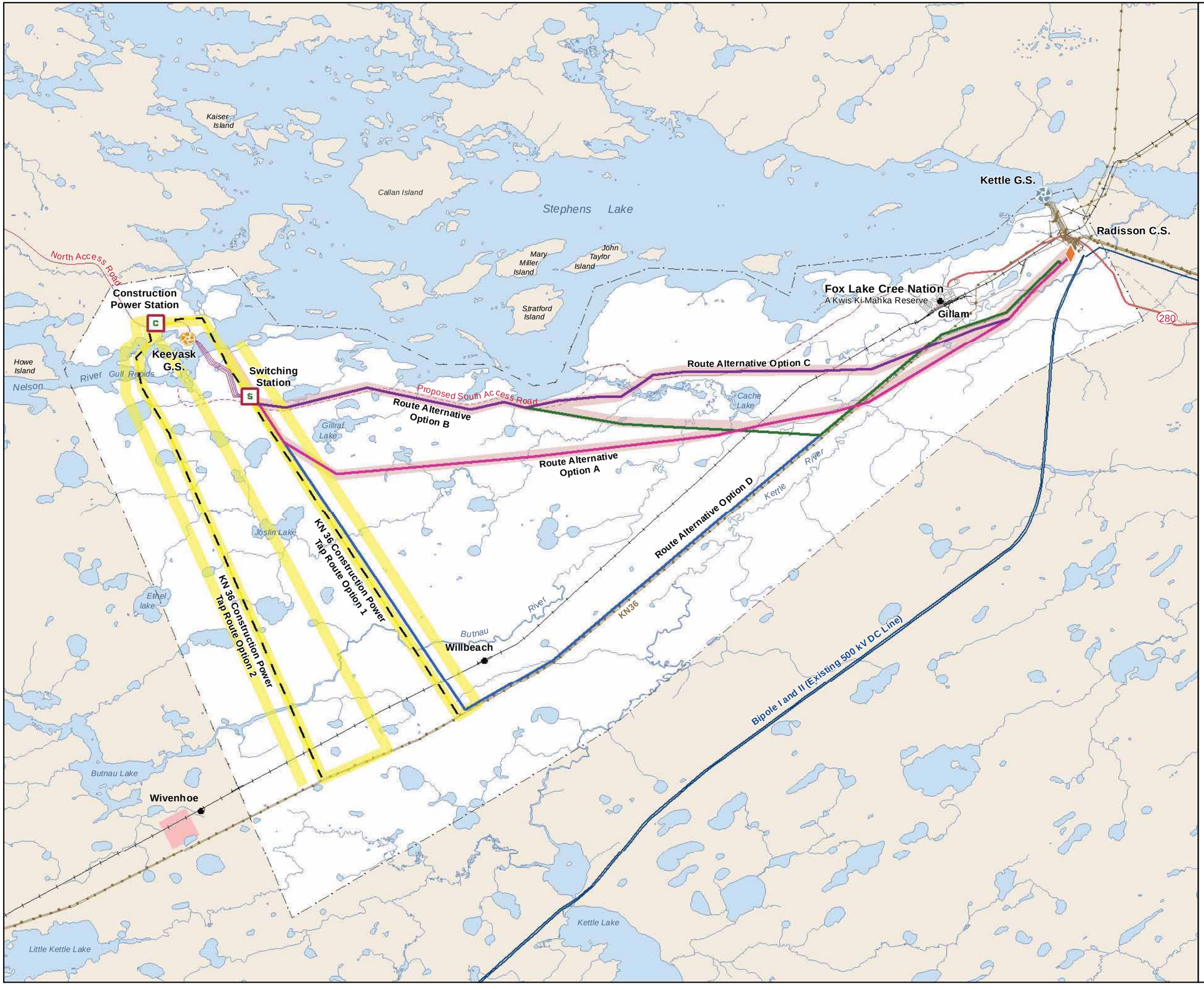
N

0 2 4 Kilometres
0 2 4 Miles

1:150,000

Habitat Types in the Project Study Area

Map 2-3



Manitoba Hydro

Keeyask Transmission Project

Project Infrastructure

- Route Alternative Option A
- Route Alternative Option B
- Route Alternative Option C
- Route Alternative Option D
- Construction Power Line (KN36) Option 1 and 2
- Unit Lines
- C — Construction Power Station
- S — Switching Station
- Project Study Area

Infrastructure

- Converter Station
- Generating Station (Proposed)
- Generating Station
- Bipole I and II (Existing 500 kV DC Line)
- Transmission Line
- North Access Road
- Proposed Access Road

Generalized Helicopter Flight Path

- Construction Power
- Collector Lines

Landbase

- Community
- Provincial Road
- Municipal Road
- Active Railway
- Abandoned Railway
- Watercourse
- Waterbody

Coordinate System: UTM Zone 15N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: Tuesday, October 09, 2012

N

0 2 4 Kilometres
0 2 4 Miles

1:150,000

Aerial Survey Routes in the Project Study Area June 2009

Map 2-4

3.0 STUDY AREA CHARACTERIZATION

3.1 STUDY AREA OVERVIEW

The Project Study Area (Map 1-1) is located in the Knee Lake Ecodistrict of the High Boreal Ecoclimate Region in northern Manitoba (Smith *et al.* 1998).

The Study Area is characterized by forest stands that are generally less than medium height, and are often more open than stands farther south. Black spruce (*Picea mariana*) is the dominant tree species in the Project Study Area with black spruce muskeg being the prominent form of plant community observed (Smith *et al.* 1998).

3.1.1 Climate

The climate of the Knee Lake ecodistrict is marked by short, cool summers and long, very cold winters. The mean annual temperature is approximately –4.1°C and the area has an average growing season of 131 days (Smith *et al.* 1998).

The average annual precipitation is approximately 500 mm, of which slightly more than one-third falls as snow. Precipitation is highest during the summer months with significant yearly variation. The district has a very cold, humid, Cryoboreal soil climate.

3.1.2 Physiography and Drainage

The Knee Lake ecodistrict is an undulating to ridged loamy, morainal plain, ranging in elevation from 213 m above-sea-level (asl) at its southern edge to about 150 m asl in the north (Smith *et al.* 1998). Drumlins, or elongated hills formed from glacial activity, provide some of the undulating terrain characteristic of this ecodistrict. Patterned fens and peat plateau bogs occupy large areas of low-lying terrain, while eskers and esker aprons create a rise in some areas. Slopes in this ecodistrict range from level in peat-filled depressions, to 10-30% on drumlin ridges (Smith *et al.* 1998). The Nelson River drainage system occupies the northwestern part of the ecodistrict while the southwestern and eastern sections are within the Hayes River system. Lakes of various sizes are distributed throughout the region. Drainage is generally northeast towards the coast (Smith *et al.* 1998).

3.1.3 Terrestrial Habitat

Land cover in 2010 was dominated by sparsely to densely treed needleleaf vegetation on thin or shallow peatlands (about 80% of the land area; Keeyask Hydropower Limited Partnership 2012). Broadleaf treed land cover accounted for approximately 1% of the land area, typically occurring on upland mineral soils, in richer riparian areas and near the Nelson River. Tall shrub

and low vegetation on mineral or peatland ecosites covered 16% of land area, primarily occurring along streams and rivers, other wet areas and poorly regenerating burned areas (a substantial proportion of the low vegetation on mineral, thin peatland and shallow peatland was treed vegetation prior to burning in wildfires during the 1980s and 1990s). Shoreline wetlands other than shallow water wetlands accounted for less than 1% of land area. Human infrastructure comprised approximately 2% of the existing land area. (Terrestrial Habitat, Ecosystems and Plants Technical Report 2012 2012).

3.2 ENVIRONMENTAL SETTING

3.2.1 Bird Overview

Approximately 178 bird species potentially breed within or migrate through the Bird Regional Study Area for the Keeyask Generation Project, which includes the Project Study Area. Of these 178 species, 155 are migratory, overwintering in southern areas and breeding in the Region and/or in areas further north. The remaining 23 species are residents which breed and overwinter within the Region. Between 2001 and 2011, 124 different species were observed during the ground-based, boat-based and helicopter-based bird surveys.

Within the Region, the diverse terrestrial habitats and abundant food sources (e.g., insects, seeds) support several landbird species (i.e., songbirds, woodpeckers, upland game birds, raptors, nighthawks), including resident species (e.g., gray jay (*Perisoreus canadensis*), ruffed grouse (*Bonasa umbellus*), boreal owl (*Aegolius funereus*) that inhabit the Region year-round. Inland lakes, creeks and wetlands provide key breeding habitats for many waterbirds including ducks, shorebirds and sandhill cranes (*Grus canadensis*).

Birds are a key food source for the Keeyask Cree Nations, with spring and fall hunts important community events. For FLCN, the spring goose hunt has become increasingly important, both for the food harvested and as a tradition that welcomes and celebrates the spring season (FLCN 2012). YFFN Community Members travel to the coastal area for their spring goose hunt (YFFN 2012). TCN members indicated that harvesting traditions were an essential ingredient of member's identity as Cree people. Further, spring and fall hunts were an annual rite binding the community together (Split Lake Cree 1996).

A number of factors, including fire, weather, disease, insect populations, human development, hunting and climate change, affect bird communities inhabiting the area. Some of the bird species at risk (e.g., rusty blackbird [*Euphagus carolinus*]) have been and will likely continue to experience population declines due to loss of overwintering habitats (COSEWIC 2006, 2007a, 2007b). Other species (e.g., turkey vulture [*Cathartes aura*]) have increased in abundance and have been expanding their range into northern areas because of climate change, increased availability of food sources and loss of habitat in their current range (Cox 2010).

3.2.2 Passerines

Of the 41 passerine species recorded in the Project Study Area during the 2009 to 2011 breeding-bird surveys, 36 were found within black spruce pure habitats (n= 140 stops; Appendix A, Table A-1) and 31 within low vegetation habitats (n= 37; Appendix A, Table A-1). Areas of tamarack mixture habitat also supported high passerine species richness (27 species; n = 16 stops) relative to other habitat types surveyed.

Blackpoll warbler (*Setophaga striata*) was the most abundant and frequently noted species occurring within all surveyed habitat types and at over half of all stops surveyed (n=279 of 490 survey stops; overall average density of 0.32 birds/ha; Appendix A, Table A-1). Common to Manitoba's northern boreal forests, this ground-nesting species has a preference for coniferous breeding habitats (Carey *et al.* 2003). Highest observed densities of blackpoll warbler occurred in pure tamarack mixture (0.94 birds/ha; Appendix A, Table A-1).

Ruby-crowned kinglet (*Regulus calendula*; occurred at nearly 33% of all stops) and northern waterthrush (*Parkesia noveboracensis*; 37% of stops) were also among the most common species observed during surveys (Appendix A, Table A-2). Ruby-crowned kinglet, a common breeder in the boreal forest that nests in coniferous tree tops, was also recorded in all surveyed habitat types. This species was most abundant in areas of black spruce mixedwood and pure jack pine vegetation (0.28 birds/ha, Appendix A, Table A-1). Northern waterthrush is a species regularly found in wet habitats supporting shrubs, such as bogs, creeks and other low-lying wet areas which are common throughout the Project Study Area.

Other bird species widespread throughout most habitat types surveyed included fox sparrow (*Passerella iliaca*; 0.18 birds/ha, 32% of n=490 stops), white-throated sparrow (*Zonotrichia albicollis*; 0.18 birds/ha, 33% of n=490 stops]), yellow-bellied flycatcher (*Empidonax flaviventris*; 0.18 birds/ha, 31% of n=490 stops), and dark-eyed junco (*Junco hyemalis*; 0.18 birds/ha, 31% of n=490 stops; Appendix A, Table A-2). These passerine species are common inhabitants of Manitoba's northern boreal forests (Carey *et al.* 2003).

Alder flycatcher (*Empidonax alnorum*), Wilson's warbler (*Wilsonia pusilla*), magnolia warbler (*Dendroica magnolia*) and winter wren (*Troglodytes hiemalis*), all low to ground nesting species, were among several bird species less commonly observed during breeding-bird surveys. Typical of moist deciduous shrub and mixedwood habitats along slow-moving creeks, alder flycatcher was observed at an average density of 0.09 birds/ha (Appendix A, Table A-1). Wilson's warbler, also known to frequent low lying wet shrubby areas, especially among young regenerating forest and along forest-edge habitats, was recorded at an average density of 0.4 birds/ha. Known to occur among mixedwood and coniferous forests, magnolia warbler and winter wren were observed at an average density of 0.04 and 0.03 birds/ha respectively (Appendix A, Table A-1).

White-winged crossbill (*Loxia leucoptera leucoptera*), red crossbill (*Loxia curvirostra*) and common redpoll (*Carduelis flammea*) are three passerine species infrequently encountered during 2009-2011 bird surveys. Considered to be cone and seed specialists, observed numbers of these three species are known to fluctuate annually with food availability (Carey *et al.* 2003). Both crossbill species are known to have sporadic occurrences throughout the province, but in Manitoba are considered to be more common to the central boreal forest south of the Project Study Area. Common redpolls are considered to be a common breeder near the treeline and as such, the Project Study Area is likely near the southern extents of this species breeding range (Carey *et al.* 2003).

Three passerine species, rusty blackbird (*Euphagus carolinus*), olive-sided flycatcher (*Contopus cooperi*) and common nighthawk (*Chordeiles minor*) were recorded during Project breeding-bird surveys conducted from 2009 through 2011, are listed as being 'at risk' by the Committee on Endangered Wildlife in Canada (COSEWIC 2009) and the federal *Species at Risk Act* (Government of Canada 2009)[2]. Details of these observations are further discussed in Section 4.1.5. All species recorded during 2009-2011 surveys were also encountered during the Keeyask Generation Project 2001-2010 breeding-bird surveys. No bird species observed were considered unique to the Project Study Area.

3.2.3 Waterbirds and Shorebirds

Observations of waterfowl and other waterbirds (cranes, gulls and shorebirds) were generally uncommon during land-based surveys, (2% of 2449 birds; Appendix A, Table A-2) and occurred primarily at survey stops that coincided with riparian habitat adjacent to creeks or lakes. Canada goose (*Branta canadensis*) was occasionally observed flying, in flocks and as individuals, over breeding-bird transects during both 2009 and 2010 surveys. In 2011, flights of geese were exempt from being counted during surveys. As these birds were in transit to other habitat types, these flight observations were recorded but excluded from further analysis of bird survey data.

Reconnaissance-based, helicopter waterbird surveys in 2009 examined inland waterbodies present in the Project Study Area. Several inland lakes, creeks and rivers are present in the area, many of which possess well-vegetated shorelines that provide suitable cover and nesting habitat for some species of waterbirds (e.g., green-winged teal [*Anas carolinensis*], ring-necked duck [*Aythya collaris*]). Helicopter-based bird surveys confirmed occasional, although not abundant, waterbird utilization of inland lakes and rivers in the Project Study Area. Surveyed lakes and rivers in general, and specifically those within and along the proposed Construction Power and Generation Outlet Transmission Line routes did not appear to support any large concentrations of waterbirds during the breeding, staging or migration periods. No inland waterbodies were identified as possessing bird habitat rare or unique to the region.

[2] It should be noted that common nighthawk is also listed by Manitoba's *Endangered Species Act*.

June surveys of the Construction Power and Generation Outlet Transmission Line alternative route options in 2009 revealed a minimum of 15 species of waterbirds utilizing surveyed inland waterbodies. Species such as black scoter (*Melanitta americana*), mallard (*Anas platyrhynchos*), ring-billed gull (*Larus delawarensis*), common merganser (*Mergus merganser*), ring-necked duck, common loon (*Gavia immer*) and Canada goose were regularly encountered in the area. Several pairs of waterbirds were observed on many waterbodies in the area indicating that the breeding season was well underway at this time.

August surveys revealed notably fewer waterbirds utilizing surveyed inland waterbodies than was observed in June, suggesting that many birds had moved on to other habitats at this time. During aerial surveys in late September, larger groups (20-50 birds) were more commonly observed relative to other months, indicating that a small population of birds use inland lakes for staging during migration. The degree of waterbird use of inland lakes is consistent with observations made during fall overflights in the Region. Most species of waterbirds tended to leave smaller lakes in favour of larger waterbodies (e.g., Gull Lake) during the fall migration season.

3.2.4 Upland Game Birds

Two upland game bird species, spruce grouse (*Falcipennis canadensis*) and ruffed grouse (*Bonasa umbellus*), were recorded during Project bird surveys (2009-2011; 0.3% of 2449 birds; Appendix A, Table A-2). The presence of grouse scat at many survey stops, as well as one identified ptarmigan (*Lagopus spp.*) kill along a survey transect, confirms the presence of at least three upland game bird species using the Project Study Area. Although not observed during surveys, sharp-tailed grouse (*Tympanuchus phasianellus*) is one other upland game bird species likely using the Project Study Area. Three of the four upland game birds (excluding ptarmigan) were observed during bird surveys in the Keeyask Generation Station Study Area between 2001-2007 (Tetr*ES* 2004a,b; 2005, 2007, 2008).

The distribution of grouse and ptarmigan is widespread throughout the Keeyask area, with these species inhabiting different vegetation communities that meet their specific diet requirements. For example, spruce grouse generally inhabit coniferous stands, as well as muskeg and bogs. Berries, leaves and insects are consumed in the summer, while conifer needles make up their winter diet (Boag and Schroeder 1992). Sharp-tailed grouse (*Lasopus lagopus*) and willow ptarmigan prefer more open habitats. Sharp-tailed grouse forage in shrub cover during the winter, switching to coniferous forest clearings, recent burns and other edges and openings during the summer. Willow ptarmigan breed in regions north of the Study Area (i.e., in tundra), and over-winter in forested habitat such as that located in the Project Study Area and the Region. Both sharp-tailed grouse and ptarmigan feed primarily on willow and birch seeds, buds, berries, leaves and insects in open areas including along cut-lines and roadways (Connelly *et al.* 1998).

3.2.5 Raptors

Raptors are comprised of three groupings: piscivorous (fish-eating) raptors, owls and other raptors (e.g., hawks and falcons, etc.). In the Project Study Area, raptor observations were relatively uncommon. During breeding-bird surveys in 2009 and 2010, bald eagles (*Haliaeetus leucocephalus*), merlins (*Falco columbarius*) and hawks were observed. Reconnaissance observations of osprey (*Pandion haliaetus*) and great-horned owl indicate that suitable habitat for these species exists in the Project Study Area. The Region has the potential to support 19 species of raptors, of which 15 are expected to breed, with the remaining four utilizing the region during migration seasons (Keeyask Limited Partnership 2012).

Tending to take vertebrate prey as food sources, piscivorous raptors build large stick nests which are often used annually atop tall trees or utility poles in proximity to wetland, flooded areas (i.e., osprey) and high in trees or along shorelines in sight of water (i.e., bald eagles). Owls prefer moist areas and mixed-wood boreal forest; hawks frequently hunt small mammals and birds in open terrain where herbaceous cover is intermixed with woody growth similar to that experienced in recently burned areas of the boreal forest (Manitoba Naturalist Society 2003). Nesting usually occurs fairly high above the ground in the lower crowns of deciduous trees or near the top of isolated conifer trees

3.2.6 Woodpeckers

While the Region has the potential to support six species of woodpeckers, observations of woodpeckers were infrequent during breeding-bird surveys in the Project Study Area. Three species were identified during 2009 and 2010 surveys including a black-backed woodpecker (*Picoides arcticus*), a hairy woodpecker (*Picoides villosus*), and a northern flicker (*Colaptes auratus*).

Black-backed woodpecker is a common year-round resident in some northern locations while the hairy woodpecker is rare to uncommon permanent residents of Manitoba (Keeyask Hydropower Limited Partnership 2012). As cavity nesters, hairy woodpeckers tend to reside in mature, deciduous and mixed-wood forests and woodlands and are much less common in coniferous forests (Manitoba Naturalist Society 2003). These bark foragers rely on heavily on insects for food sources, but have also been known to consume fruits, berries, nuts, and sometimes tree sap (Jackson et al. 2002). Black-backed woodpeckers on the other hand, prefer recently burned coniferous stands utilizing the burned tree trunks to forage for insect larvae (Manitoba Naturalists Society 2003).

Northern flickers are migrant breeders in the Region frequently feed on the ground. Although fruits, berries, seeds and nuts make up part of their diet, their primary food is insects. Flickers prefer open habitats near trees, including woodlands and edges and generally nest in holes in trees like other woodpeckers. Occasionally, they have been found nesting in old, earthen

burrows vacated by belted kingfishers or bank swallows, species both known to reside in the Region (Wiebe et al. 2008).

3.2.7 Valued Environmental Components

3.2.7.1 Common Nighthawks

A single common nighthawk was recorded during both 2010 and 2011 bird surveys in the Project Study Area. In 2010, surveys associated with the Generation Outlet Transmission Line route options identified this species along a raised esker dominated by jack pine pure vegetation adjacent to black spruce pure and low vegetation habitats (Map 3-1). In 2011, surveys associated with the Construction Power Transmission Line route options identified a common nighthawk among low, sparsely vegetated black spruce habitats (Map 3-1).

Common nighthawks have the potential to be affected by transmission line development in the boreal forest. The cleared right-of-way may create foraging opportunities for common nighthawks and development of associated infrastructure could create areas of bare ground which may be utilized for nesting.

As the common nighthawk has been observed in the Project Study Area, has the potential to be affected by the Project and is a species of regulatory interest (listed by the Committee on the Status of Endangered Wildlife in Canada [COSEWIC], the Manitoba *Endangered Species Act* [MESA], and *Species at Risk Act* [SARA], it has been selected as a bird VEC.

3.2.7.2 Raptors

Raptor observations were uncommon during terrestrial breeding bird surveys (<0.1% of 2449 birds; Appendix A, Table A-2). Bald eagle, merlin and one unidentified hawk species were the only raptors observed during surveys.

Reconnaissance observations identified two osprey that were nesting on an existing transmission tower, adjacent to Generation Outlet Transmission Line Route Option A (Map 3-1). Two osprey were observed nesting at this site in 2009, 2010 and 2011. Additional reconnaissance observations by a field team conducting mammal studies in the Keeyask Transmission area in June 2009 identified the location of a great-horned owl nest along Construction Power Transmission Line Route Option 1 (Map 3-1). Investigations by the bird survey team on June 24, 2009, confirmed that the nest was active and one owl was observed flying out of the nest.

Potential for Project effects on raptors are quite variable. Some interior forest species will be mainly unaffected by transmission line development. Other species, which forage in boreal forest openings could be attracted to cleared rights-of-way associated with transmission lines and access routes to station infrastructure. These species will have potential for Project-related

effects (increased foraging opportunities, line strikes, etc.). Due to the potential for effects on some of the members of the raptor group and the broad-based habitat utilization of the group as a whole, raptors were selected as a VEC for the Project.

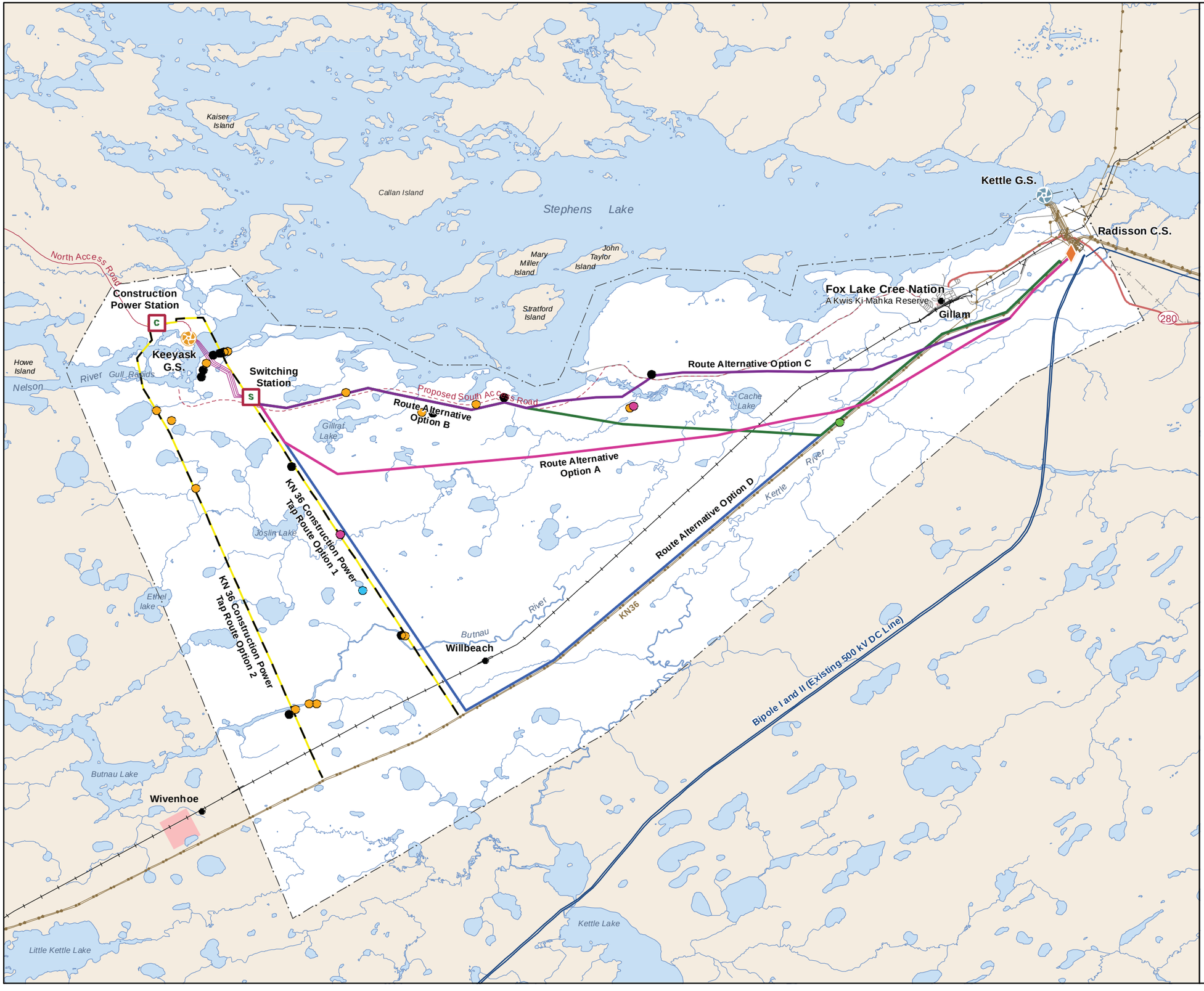
Rusty blackbird and Olive-sided flycatcher were also selected as VECs for the Project. They are discussed below.

3.2.8 Species at Risk

Three species listed as 'at risk' by the COSEWIC, *SARA* and/or *MESA* were observed during 2009 through 2011 breeding-bird studies in the Keeyask Transmission Study Area, including: rusty blackbird (special concern status by COSEWIC [2012] and SARA [Government of Canada 2009]), olive-sided flycatcher (threatened status by COSEWIC [2012] and SARA [Government of Canada 2009]) and common nighthawk (threatened status by COSEWIC, schedule 1 of *SARA* and *MESA*). These three species were all selected as Project VECs.

In addition to the species observed, yellow rail (*Coturnicops noveboracensis*), short-eared owl (*Asio flammeus*), red knot (*Calidris canutus*) and peregrine falcon (*Falco peregrinus*) have the potential to range in or through the study area. Due to the transient nature of these species potential occurrence in the study area, Project-related effects are expected to be not significant.

Rusty blackbird observations occurred at several stops throughout the Project Study Area (Map 3-1) situated among immature, coniferous forest within or adjacent to riparian or low-lying, wet areas. Olive-sided flycatcher were also distributed throughout the Project Study Area (Map 3-1) within mature, coniferous forest, generally with low crown closure (20-50%) located adjacent to riparian habitat (i.e., the Nelson River, Butnau River, and wetlands; Map 3-1). Common nighthawk is discussed in Section 3.2.7.1 above.



Manitoba Hydro

Keeyask Transmission Project

Project Infrastructure

- Route Alternative Option A
- Route Alternative Option B
- Route Alternative Option C
- Route Alternative Option D
- Construction Power Line (KN36) Option 1 and 2
- Unit Lines
- Construction Power Station
- Switching Station
- Project Study Area

Infrastructure

- Converter Station
- Generating Station (Proposed)
- Generating Station
- Bipole I and II (Existing 500 kV DC Line)
- Transmission Line
- North Access Road
- Proposed Access Road

Species Observations

- Osprey Nest (Active - 2009-2011)
- Great-horned Owl Nest (Active 2010)
- Common Nighthawk
- Olive-sided Flycatcher
- Rusty Blackbird

Landbase

- Community
- Provincial Road
- Municipal Road
- Active Railway
- Abandoned Railway
- Watercourse
- Waterbody

Coordinate System: UTM Zone 15N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: Tuesday, October 09, 2012

N

0 2 4 Kilometres
0 2 4 Miles

1:150,000

Species at Risk and Active Raptor Nests Observed during Breeding Bird Surveys 2009 - 2011

Map 3-1