APPENDIX B

ENVIRONMENTAL SETTING INFORMATION

Appendix B1

Aquatic Environment Information

Table B1-1: *In situ* Water Quality Parameters Measured at the Stream Crossing Sites

Location ID	Sample Date	Time	UTM (15V) Northing	UTM (15V) Easting	Total Depth (m)	Ice Depth (m)	Effective Depth[1] (m)	Temperature (°C)	DO (mg/L)	DO (% Saturation)	pH
Open-Water Season											
SC-1	17-Jun-03	10:40	361400	6250123				17.5	9.37	98	7.85
SC-1	14-Jul-03	13:10						18.6	7.87	84	7.94
SC-1	25-Aug-03	13:52						18.4	8.91	95	8
SC-1	30-Sep-03	14:19						4.8	12.38	100	8.01
SC-1	23-Jun-04	14:55	361830	6250384				11.8	12.3	114	7.89
SC-1	20-Jul-04	8:15	361699	6250276				17.2	3.64	38	7.66
SC-1	31-Aug-04	13:28	359942	6250140				10.4	9.54	86	7.73
SC-1	5-Oct-04	15:16						5.7	12.41	102	7.71
SC-1	16-May-05	9:30	360595	6250077	1.13			5.8	12.62	104	-
SC-2	17-Jun-03	11:00	345436	6254874				16.2	8.05	82	7.27
SC-2	14-Jul-03	13:32						18.7	6.28	67	7.14
SC-2	25-Aug-03	14:11						15.1	3.55	35	6.96
SC-2	30-Sep-03	14:38						4.4	9.32	75	6.82
SC-2	23-Jun-04	15:15	345771	6255326	0.23			7.8	11.82	102	7.61
SC-2	20-Jul-04	8:40						9.6	6.96	62	7.73
SC-2	31-Aug-04	13:44	345771	6255825	0.25			6.5	13.06	109	7.72
SC-2	5-Oct-04	15:30			0.33			2.2	14.22	109	7.1
SC-2	16-May-05	-	345689	6254940	0.38			4.6	9.25	75	7.71
Winter 2005											
SC-1	19-Mar-05	11:04	360550	6250031	1	1	0	-	-	-	-
SC-2[2]	19-Mar-05	10:34	345190	6254273	0.49	0.28	0.21	1.1	1.72	13	-

[1]Calculated. Effective depth = Total depth - Ice depth

[2]Sample site 1 km upstream of actual stream crossing site

Figure B1-1: Stream Crossing Aquatic Habitat Assessment Sheets

ROW Watercourse Crossing Description

Figure 1: Aerial view of Looking Back Creek with the crossing location indicated by the red line and the direction of flow by the white arrow.

Figures 2 and 3: Upstream view (left photo) and downstream view of Looking Back Creek, with the crossing location indicated by the red line and the direction of flow by the white arrow.

Keeyask Access Road
Stream Crossing Assessment

Location

UTM:	0360595 / 6250077 - NAD 83	**Watercourse Name:**	Looking Back Creek
Date:	7 October, 2004	**Site:**	SC – 1

Site Description

Stream Order:	3
Watershed Size:	124.7 km^2
Upstream of Crossing:	119.8 km^2
Regulated:	No
Channelized:	No
Channel Width:	7.4 m
Wetted Width:	7.4 m
Floodplain Width:	Right: 17 m, Left: 14 m
Maximum Depth:	0.8 m
Stage:	Moderate
Sign of flood above surveyed stage:	0.3 m
Valley Slope Gradient:	Left – 5% Right – 6%
Stream Gradient:	1%
Velocity:	0.31 m/sec
Discharge:	1.32 m^3/sec
Cover Type and Composition:	Total – 30% Over Veg. – 10% LOD – 30% Cutbank – 10% Boulder – 10% In. Veg. – 40%
Habitat Type:	Run – 100%
Bottom Contour:	Uniform
Substrate Type:	Fines – 90% Boulder – 10%
Substrate Compaction:	Moderate
Bank Unstable:	0%
Water Temperature:	3 °C
Turbidity:	7.1 NTU

Riparian Vegetation:	The creek lies within a relatively narrow, well-drained floodplain containing grasses and willows. The valley forest is composed of black spruce and jackpine with an understory of moss, shrubs, and forbs.
Aquatic Vegetation:	Yes
Unique Features:	n/a
Summary:	This crossing is located in the lower portion of the creek, approximately 4 km from Stephens Lake. Habitat in the creek consists primarily of run habitat less than 1 m deep, with some side channel pools. Small areas of gravel/cobble riffle occur further upstream from the crossing. The creek substrates are primarily fines with some boulder and cobble/gravel. The presence of beaver dams began 2 km upstream of the crossing, continuing upstream to the headwaters.

Fisheries Assessment

Capture Method:	Fall 2004 - Backpack Electrofishing, 1.5" and 3.5" gillnet. Spring 2005 – Hoopnet, kicknet.
Species Present:	Fall 2004 - None. Spring 2005 – walleye, northern pike.
Life History Stage:	Fall 2004 - n/a Spring 2005 – pre-spawn and post-spawn adults. One northern pike egg.

[1] For example: walleye, pike, suckers

[2] For example: sticklebacks, minnows

Fisheries Assessment

Large-bodied Species[1]

Spawning:	Yes.
Migration:	Yes.
Rearing:	Yes.
Over-wintering:	Possibly.

Small-bodied Species[2]

Open-water Presence:	Yes.
Over-wintering:	Possibly.

Fish Use and Fish Habitat Summary

This creek provides good habitat for spring and summer spawning, foraging, and rearing for small and large-bodied species. Spawning habitat for walleye or suckers was not present at the crossing site. Vegetated areas of run habitat along the shorelines may be used by pike for spawning. Overwintering habitat may be present at the crossing site in some years but not in others. Habitats in the crossing area were common elsewhere in Looking Back Creek and no rare habitats were present (i.e. gravel riffles, deep off-current pools). Access to the creek from Stephens Lake was unimpeded by Beaver dams.

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Figure B1-1: Stream Crossing Aquatic Habitat Assessment Sheets

ROW Watercourse Crossing Description

Figure 1: Aerial view of Unnamed Creek with the crossing location indicated by the red line and the direction of flow by the white arrow.

Figures 2 and 3: Upstream view (left photo) and downstream view of Unnamed Creek at the crossing location.

Keeyask Access Road
Stream Crossing Assessment

Location

UTM:	0345689 / 6254940 - NAD 83
Date:	6 October, 2004
Watercourse Name:	Unnamed Tributary of the South Moswakot River
Site:	SC– 2

Site Description

Stream Order:	1
Watershed Size:	35.5 km^2
Upstream of Crossing:	4.0 km^2
Regulated:	No
Channelized:	No
Channel Width:	2.5 m
Wetted Width:	2.2 m
Floodplain Width:	Right: 8 m, Left: 8 m
Maximum Depth:	0.6 m
Stage:	Moderate
Sign of flood above surveyed stage:	n/a
Valley Slope Gradient:	Left – 12% Right – 10%
Stream Gradient:	1%
Velocity:	0.02 m/sec
Discharge:	0.02 m^3/sec
Cover Type and Composition:	Total – 60% Over Veg. – 50% LOD – 30% Cutbank – 10% In. Veg. – 10% Canopy Clos. – 80%
Habitat Type:	Pool – 100%
Bottom Contour:	Uniform
Substrate Type:	Fines – 100%
Substrate Compaction:	Low
Bank Unstable:	0%
Water Temperature:	1 °C
Turbidity:	1.5 NTU

Riparian Vegetation:	The creek lies within a relatively narrow, floodplain containing dense willow growth, sedges, grasses, and forbs. The valley forest is composed of black spruce with a moss understory. Further upstream and downstream of the crossing, the creek flows through a broad poorly drained floodplain.
Aquatic Vegetation:	Yes
Unique Features:	Approximately 50 m downstream of the crossing, a log ramp has been constructed to permit crossing the creek along a cut line.
Summary:	This small creek drains two small lakes prior to entering the South Moswakot River (approximately 10 km downstream of the crossing). The crossing is located approximately 1 km from the headwater of the creek. A small beaver dam immediately downstream of the crossing creates a small pool at the crossing site. Several side channels occur within the floodplain.

Fisheries Assessment

Capture Method:	Fall 2004 and Spring 2005- Backpack Electrofishing
Survey Length:	50 m
Species Present:	None.
Life History Stage:	n/a

[1] For example: walleye, pike, suckers

[2] For example: sticklebacks, minnows

Fisheries Assessment

Large-bodied Species[1]

Spawning:	No.
Migration:	No.
Rearing:	No.
Over-wintering:	No.

Small-bodied Species[2]

Open-water Presence:	Possibly.
Over-wintering:	No.

Fish Use and Fish Habitat Summary

If fish make use of this site it is likely restricted to spawning, foraging, and rearing during summer by small-bodied species such as brook stickleback and fathead minnow. Low DO levels or absence of water indicate that this habitat does not support fish in winter. The distance from over-wintering habitat and large number of beaver dams reduces the quality of habitat and the likelihood of fish use. Habitat in this creek at the crossing site is typical for this creek and others in the area.

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Table B1-2: Presence of Aquatic Invertebrates From Kick Net Samples in Streams Along the Proposed Road

Crossing	SC-1			SC-2		
Site	Crossing	Upstream	Downstream	Crossing	Upstream	Downstream
Date	07-Oct-04	07-Oct-04	07-Oct-04	06-Oct-04	06-Oct-04	06-Oct-04
Annelida						
Oligochaeta	X	X	X	X	X	X
Hirudinea	X	X	X	X	X	-
Crustacea						
Ostracoda	X	X	-	X	X	X
Amphipoda	X	X	X	-	-	-
Arachnida						
Acarina	-	-	-	-	X	X
Mollusca						
Bivalvia						
Pisidiidae	X	X	X	X	-	X
Gastropoda						
Hydrobiidae	-	-	X	-	-	-
Lymnaeidae	-	-	X	-	-	-
Physidae	-	-	-	-	-	-
Planorbidae	X	X	X	-	-	-
Valvatidae	-	X	X	-	-	-
Entognatha						
Collembola (semi-aquatic)	-	-	-	X	X	X
Insecta						
Odonata						
Anisoptera						
Corduliidae	X	-	-	-	-	-
Zygoptera						
Aeshnidae	-	-	-	-	-	-
Coenagrionidae	-	-	X	-	-	-
Coleoptera						
Chrysomelidae (aquatic)	-	-	X	-	-	-
Chrysomelidae (semi-aquatic)	-	-	-	-	X	-
Dytiscidae	-	-	X	-	-	-
Elmidae	X	X	-	-	-	-
Haliplidae	-	X	X	-	-	-
Staphylinidae (semi-aquatic)	-	-	-	-	-	-
Hemiptera						
Corixidae	-	-	X	-	-	-
Ephemeroptera						
Baetidae	X	X	X	-	X	-
Caenidae	X	X	X	-	-	-
Ephemerellidae	-	X	X	-	-	-
Ephemeridae	X	X	X	-	-	-
Heptageniidae	X	-	-	-	-	-
Leptophlebiidae	X	X	X	X	X	X
Plecoptera						
Nemouridae	X	X	-	-	-	X
Perlodidae	X	-	-	-	-	-
Trichoptera						
Brachycentridae	-	-	-	-	-	X
Hydropsychidae	X	-	X	-	-	-
Hydroptilidae	X	X	X	-	-	-
Lepidostomatidae	X	X	X	-	X	-
Limnephilidae	X	X	X	-	X	-
Phryganeidae	X	-	-	-	X	-
Polycentropodidae	X	X	X	-	-	-
Diptera						
Ceratopogonidae	X	-	-	X	-	X
Chaoboridae	-	-	-	-	-	-
Chironomidae	X	X	X	X	X	X
Dixidae	-	-	-	-	-	-
Empididae	-	-	-	-	-	X
Simuliidae	X	X	X	-	-	-
Number of Invertebrate Taxa	**24**	**21**	**25**	**8**	**12**	**11**
Total for Stream Crossing		**33**			**17**	

Appendix B2

Terrestrial Ecosystems and Habitat Information

TERRESTRIAL HABITAT APPROACH AND METHODS

Terrestrial ecosystems and habitat can be classified into two major types, upland and wetland, based on dramatic differences in surface water, groundwater and the dominant disturbance regimes. Wetlands are land areas where groundwater, surface water and ice conditions and processes are the dominant influences on vegetation and soils. Wetland classes include bog, fen, swamp, marsh and shallow water (National Wetlands Working Group 1997). Bogs, fens and some swamps are peatlands. Uplands are all areas that are not wetlands. Large fires are the dominant disturbance type on uplands and the treed peatland types in the Regional Study Area (RSA). In the remaining wetland types, water and ice regimes are the dominant disturbance regimes.

HABITAT MAPPING

Mapping for the proposed Infrastructure Project environmental assessment focuses on the attributes that are generally important to the species of interest for the assessment as well as the other key topics such as wetland function. A mapped type is a combination of soils, vegetation, depth to groundwater, permafrost, topography and disturbance regime that is distinctly different from surrounding areas. The resulting maps are referred to as habitat maps due to the focus on habitat for plants and animals.

Terrestrial habitat was mapped at a scale of 1:15,000 for a 1,502 km^2 area surrounding the proposed Project (i.e., the Habitat Mapping Area; see Figure 3.4-1). Habitat attributes were photo-interpreted from black and white stereo photos taken on July 8, 2003 at a scale of 1:15,000, for most of the Habitat Mapping Area. Photos taken in 1999 at 1:20,000 scale, 1991 at 1:12,000 scale and 1986 at 1:20,000 scale were used where 2003 photo coverage was not available. Although map validation demonstrated that tamarack is underrepresented in the habitat mapping, the bias is lower than in the Forest Resource Inventory that existed for the southern portion of the Habitat Mapping Area.

Historical fire mapping was derived from a combination of sources including photo-interpretation, provincial fire history records, the federal large fire database, low altitude helicopter photos and Landsat 7 imagery *(ca.* 2000).

Habitat characterization data was collected in 201 plots located in the RSA during the summers of 2003, 2004, 2007 and 2008 (see Figure 1 for sample locations in the Local Study Area (LSA). These plots were located in a range of habitat types. Vegetation, soils, woody material, groundwater, permafrost, disturbance and other relevant environmental data were collected at each plot. Soil profiles in 136 additional locations were sampled during the summer of 2002.

ECOSYSTEM DIVERSITY AND HABITAT TYPES

Ecosystem diversity was measured as the number and relative amounts of habitat types. These measures were derived from the Habitat Mapping Area. Some habitat area percentages were scaled to the RSA for the assessment of some habitat effects that are evaluated on a percentage of area basis. A comparison of fire history, waterbody and small-scale surface materials mapping in the Habitat Mapping Area and the broader Regional Study Area suggested that habitat composition was

similar. The assumption that the Habitat Mapping Area is representative of the Regional Study Area may not hold for very uncommon habitat types. This issue was addressed by showing that effects can generally be reduced below acceptable levels using the Habitat Mapping Area as the assessment region. Consequently, it was not necessary to assume that a similar percentage of these habitat types were found elsewhere in the larger region.

The common and several other habitat types were characterized based on the habitat characterization field data. A plant species was considered to be "characteristic" of a habitat type if it occurred in at least 75% of the plots sampled in that type and at least 15 plots were sampled.

Priority habitat types considered in the terrestrial habitat and ecosystem effects assessment were habitat types that are regionally rare and/or highly diverse. Priority habitat types were identified in three steps. First, similar broad habitat types were combined into generalized habitat types. Second, rare habitat types were identified by classifying a generalized habitat type as very uncommon if it covered less than 1.01% of Habitat Mapping Area land area, uncommon if it covered between 1.01 and 10% of the land area, and, common for the remaining types. Young regenerating burns were not considered for priority habitat types because they are an age class of other habitat types and because they are continually created by frequent large fires. In the third step, a generalized habitat type was classified as diverse if it typically includes a relatively high number of plant species and/or a relatively high degree of structural diversity. Typical species richness and structural diversity were determined from habitat characterization plots sampled in the RSA.

WETLAND FUNCTION

Given the limited scope of the proposed Project, potential changes to peatland composition, high-quality wetland composition and local hydrology are used as a proxy for potential effects on wetland function. In other words, if the proposed Project is expected to have little effect on these attributes then changes to wetland function are not expected.

High quality wetlands in the LSA were identified through two steps. First, wetlands in the Habitat Mapping Area were extracted from the terrestrial habitat map. Second, for the LSA, low level helicopter photos were used to select the high quality wetlands and wetlands that were too small to appear in the habitat map. The second step was not completed for the Habitat Mapping Area outside of the LSA given the level of effort required relative to anticipated potential Project effects.

Most carbon is stored in the soil in northern terrestrial ecosystems (Robinson and Moore 1999; Vardy *et al.* 2000). Given the limited scope of the proposed Project, potential effects on carbon cycling are assessed by estimating changes to total peatland area by peatland type. These measures are a proxy for total peatland soil organic matter.

PLANTS

Plant species nomenclature follows Flora of North America (Flora of North America Editorial Committee 1993+) where volumes currently exist for the genus and the Manitoba Conservation Data Centre elsewhere. Priority plant species in this assessment are those that are rare, near a range

limit, invasive or non-native. Rare, invasive and non-native plant surveys were conducted in 2004 and 2008 (Figure B2-1 in Appendix B2). Habitat characterization plots provided supplemental rare, invasive and non-native plant location data. Some species of conservation concern may be present but undetected in the LSA. A list of rare plant species that may occur in the LSA was generated based on species found in all of the RSA sample locations.

FRAGMENTATION

Human linear features have a number of potential effects on ecosystem functions and landscape flows. Linear features convert habitat into other types, fragment habitat, act as a conduit, filter, source and/or sink for species and create edge which reduces habitat for interior species. Linear features serve as a conduit when they increase predation or facilitate the expansion of invasive plant species, among other things. Linear features that act as filters reduce connectivity, which affects genetic interchange. A road functions as a sink when crossing animals are killed by vehicles. These are only a few examples that illustrate the ecological functions of linear features.

Fragmentation essentially refers to the extent to which an area is broken up into smaller areas by human features and how easy is it for animals, plant propagules and other ecological flows such as surface water to move from one area to another area. Road density (i.e., km of roads per km^2 of study area) can be a good synthetic indicator of the extent of fragmentation effects on plant and animal populations (Forman 1995). Among other things, increasing road density improves access which can lead to increased resource harvesting, habitat disturbance and fire frequency. Non-linear human features that contribute to fragmentation (e.g., communities) are usually located along roads in the north.

Road density in the Habitat Mapping Area was used a synthetic indicator of fragmentation. All weather roads were mapped from the same stereo photos that were used for the habitat mapping.

Past studies that have used benchmarks for road density effects have used values estimated for grizzly bears from field data. Grizzly bears are considered to be one of the North American species that is most sensitive to roads (AXYS 2001). If the grizzly bear is the most sensitive species, then the grizzly bear benchmark should be a cautious benchmark for other species. Road densities below 0.16 km/km^2 are not expected to affect grizzly bears (AXYS 2001).

Table B2.2-1: Soil Order for Soil Sample Locations in the Habitat Mapping Area		
Soil Order	**N**	**Percentage of Locations**
Non-soil (outcrop)	6	0.6
Brunisolic	91	9.8
Cryosolic	241	26.0
Gleysolic	56	6.0
Luvisolic	13	1.4
Organic	442	47.7
Regosolic	77	8.3
All	926	100.0

Table B2-2: Ecosite Composition of the Project Study Areas as a Percentage of Total Land Area (%(ha))[1]

Ecosite	Project Footprint				LSA (includes Project Footprint)	Region[2]
	Borrow Area Zones	Infra-structure	Road	All		
Bedrock outcrop						0 (*36*)
Thin mineral					0 (*26*)	0 (*454*)
Moderately deep mineral						0 (*280*)
Deep mineral	18 (*211*)	26 (*90*)	14 (*33*)	19 (*334*)	15 (*1,146*)	10 (*10,374*)
Thin, wet peat	1 (*14*)	0 (*1*)	0 (*0*)	1 (*16*)	1 (*47*)	1 (*1,451*)
Veneer bog	39 (*454*)	48 (*166*)	47 (*109*)	41 (*729*)	32 (*2,432*)	39 (*41,701*)
Blanket peatland	17 (*203*)	5 (*18*)	27 (*63*)	16 (*284*)	24 (*1,812*)	26 (*28,433*)
Peat plateau bog	0 (*3*)	0 (*0*)		0 (*4*)	0 (*25*)	0 (*419*)
Peat plateau bog/ collapse scar mosaic	13 (*152*)	15 (*53*)	11 (*25*)	13 (*230*)	16 (*1,231*)	11 (*11,567*)
Peat plateau bog forming or disintegrating	5 (*54*)	1 (*4*)	1 (*3*)	3 (*61*)	6 (*429*)	5 (*5,238*)
Collapse scar					0 (*4*)	0 (*160*)
Wet, deep peat	0 (*1*)	0 (*0*)	0 (*0*)	0 (*1*)	0 (*32*)	1 (*883*)
Horizontal peatland	2 (*26*)	1 (*3*)		2 (*29*)	2 (*152*)	3 (*3,457*)
Aquatic peatland	4 (*47*)	2 (*8*)	0 (*0*)	3 (*55*)	4 (*293*)	3 (*3,533*)
Human	1 (*10*)	1 (*5*)	0 (*1*)	1 (*16*)	0 (*34*)	0 (*172*)
Total Land Area (ha)	***100 (1,176)***	***100 (347)***	***100 (234)***	***100 (1,758)***	***100 (7,664)***	***100 (108,162)***

[1] A value of 0 indicates a percentage that rounds to 0; a blank indicates that the type is absent.
[2] Reported values are calculated from the Habitat Mapping Area. Regional Study Area expected to have similar percentages.

Table B2-3: Project Study Areas for Terrestrial Ecosystems and Habitat					
Study Area	**Footprint**	**Feature**	**Size (ha)**		
			Project Footprint	**Indirect Habitat Effects Zone (i.e., 150 m buffer of Project Footprint) and Direct Project Effects in this Zone**	**Total**
Land and Water Area					
Project Areas					
	Road	100 m Right-Of-Way	234	380	614
	Borrow Zone	G-1	871	203	1,014
	Borrow Zone	G-5	313	109	422
	Infrastructure	Start-up Camp	30	23	53
	Infrastructure	Main Camp (Phase One)	317	115	432
	All of the above		*1,765*	*830*	*2,595*
	Indirect Ecosystem and Other Direct Project Effects		n/a	5,273	5,273
	All of the above[1]		*1,765*	*6,103*	*7,868*
Local Study Area[2]					7,868
Habitat Mapping Area					150,198
Regional Study Area					14,000,000
Land Area					
Project Areas					
	Road	100 m Right-Of-Way	234	376	610
	Borrow Zone	G-1	863	201	1,064
	Borrow Zone	G-5	312	109	421
	Infrastructure	Start-up Camp	30	23	53
	Infrastructure	Main Camp (Phase One)	317	115	432
	All of the above		*1,756*	*824*	*2,581*
	Indirect Ecosystem and Other Direct Project Effects		n/a	5,083	5,083
	All of the above[1]		*1,756*	*5,907*	*7,664*
Local Study Area[2]					7,664
Habitat Mapping Area					108,162
Regional Study Area					10,080,000

[1] Total area for all project footprints is the Local Study Area.

[2] Total area of project footprints and Indirect Habitat Effects Zone and Other Direct Project Effects

Table B2-4: Land Cover Composition of the Project Study Areas as a Percentage of Total Land Area (%(ha))[1]

Land Cover	Project Footprint				LSA (includes Project Footprint)	Region[2]
	Borrow Area Zones	Infra-structure	Road	All		
Broadleaf Treed on Mineral Soil	1 (*8*)	2 (*8*)		1 (*17*)	0 (*33*)	0 (*395*)
Broadleaf Treed on Peatland	0 (*2*)			0 (*2*)	0 (*5*)	0 (*95*)
Needleleaf Treed on Mineral Soil	6 (*73*)	16 (*55*)	7 (*17*)	8 (*145*)	8 (*580*)	8 (*8,859*)
Needleleaf Treed on Peatland	24 (*288*)	12 (*43*)	37 (*87*)	24 (*418*)	35 (*2,667*)	67 (*72,327*)
Tall Shrub or Low Vegetation on Mineral Soil	1 (*11*)	2 (*7*)	0 (*1*)	1 (*19*)	1 (*44*)	1 (*1,138*)
Tall Shrub or Low Vegetation on Peatland	13 (*153*)	4 (*13*)	3 (*8*)	10 (*174*)	14 (*1,102*)	16 (*16,948*)
Outcrop						0 (*36*)
Regenerating Recent Burn on Mineral Soil	10 (*118*)	6 (*20*)	7 (*16*)	9 (*154*)	7 (*515*)	1 (*716*)
Regenerating Recent Burn on Peatland	44 (*512*)	57 (*197*)	45 (*105*)	46 (*814*)	35 (*2,684*)	7 (*7,477*)
Human Features	1 (*10*)	1 (*5*)	0 (*1*)	1 (*16*)	0 (*34*)	0 (*170*)
Total Land Area (ha)	***100 (1,176)***	***100 (347)***	***100 (234)***	***100 (1,758)***	***100 (7,664)***	***100 (108,162)***

[1] A value of 0 indicates a percentage that rounds to 0; a blank indicates that the type is absent.
[2] Reported values are calculated from the Habitat Mapping Area. Regional Study Area expected to have similar percentages.

Table B2-5: Vegetation Structure Composition of the Project Study Areas as a Percentage of Total Vegetated Area (%(ha))[1]

Vegetation Structure	Project Footprint				LSA (includes Project Footprint)	Region[2]
	Borrow Area Zones	Infra-structure	Road	All		
Forest	12 (*140*)	17 (*59*)	12 (*29*)	13 (*227*)	12 (*945*)	16 (*17,106*)
Forest/ Tall Shrub	0 (*0*)			0 (*0*)	0 (*1*)	0 (*28*)
Woodland	12 (*134*)	9 (*31*)	18 (*41*)	12 (*206*)	15 (*1,140*)	27 (*29,396*)
Woodland/ Tall Shrub	0 (*0*)		0 (*0*)	0 (*0*)	0 (*3*)	0 (*109*)
Woodland & Sparsely Treed Mixture	2 (*22*)	0 (*0*)	5 (*11*)	2 (*33*)	7 (*513*)	21 (*22,468*)
Woodland & Sparsely Treed Mixture/ Tall Shrub						0 (*63*)
Sparsely Treed	6 (*68*)	4 (*12*)	10 (*23*)	6 (*103*)	8 (*640*)	11 (*11,963*)
Sparsely Treed/ Tall Shrub	0 (*4*)	1 (*4*)	0 (*0*)	0 (*8*)	0 (*21*)	0 (*252*)
Tall Shrub	1 (*17*)	0 (*1*)	0 (*1*)	1 (*19*)	1 (*85*)	1 (*931*)
Low Vegetation	13 (*147*)	5 (*19*)	3 (*8*)	10 (*173*)	14 (*1,062*)	16 (*17,171*)
Regenerating Recent Burn	54 (*630*)	63 (*216*)	52 (*121*)	56 (*967*)	42 (*3,199*)	8 (*8,194*)
Total Area (ha)	***100 (1,166)***	***100 (343)***	***100 (234)***	***100 (1,742)***	***100 (7,630)***	***100 (107,990)***

[1] A value of 0 indicates a percentage that rounds to 0; a blank indicates that the type is absent.
[2] Reported values are calculated from the Habitat Mapping Area. Regional Study Area expected to have similar percentages.

Table B2-6: Broad Habitat Composition of the Project Study Areas as a Percentage of Total Land Area (%(ha))[1]

Broad Habitat Type[3]	Project Footprint				LSA (includes Project Footprint)	Region[2]
	Borrow Area Zones	Infra-structure	Road	All		
TA Mixture on Mineral Soil	0 (*3*)	1 (*5*)		0 (*8*)	0 (*9*)	0 (*119*)
TA Mixedwood on Mineral Soil	0 (*2*)	1 (*3*)		0 (*5*)	0 (*18*)	0 (*210*)
JP Pure on Mineral Soil	1 (*17*)			1 (*17*)	0 (*35*)	0 (*342*)
JP Pure on Peatland	1 (*8*)			0 (*8*)	0 (*10*)	0 (*51*)
JP Mixture on Mineral Soil	1 (*17*)		3 (*7*)	1 (*24*)	2 (*138*)	0 (*418*)
JP Mixture on Peatland	0 (*5*)		2 (*4*)	0 (*8*)	0 (*32*)	0 (*202*)
JP Mixedwood on Mineral Soil	0 (*6*)			0 (*6*)	1 (*70*)	0 (*92*)
BS Pure on Mineral Soil	3 (*29*)	13 (*44*)	3 (*8*)	5 (*82*)	3 (*267*)	6 (*6,716*)
BS Mixture on Mineral Soil		3 (*11*)	1 (*2*)	1 (*12*)	1 (*44*)	1 (*845*)
BS Mixedwood on Mineral Soil	0 (*4*)			0 (*4*)	0 (*24*)	0 (*307*)
BS Pure on Peatland	21 (*252*)	11 (*39*)	32 (*75*)	21 (*367*)	33 (*2,506*)	64 (*68,899*)
BS Pure/ Tall Shrub on Peatland	0 (*4*)	1 (*4*)	0 (*0*)	0 (*8*)	0 (*24*)	0 (*381*)
BS Mixture on Peatland	1 (*16*)	0 (*0*)	4 (*9*)	1 (*25*)	1 (*67*)	1 (*1,427*)
TL Pure on Peatland					0 (*0*)	0 (*150*)
TL Mixture on Peatland	0 (*1*)			0 (*1*)	0 (*13*)	1 (*1,093*)
Tall Shrub on Peatland	1 (*17*)	0 (*1*)	0 (*1*)	1 (*19*)	1 (*85*)	1 (*898*)
Low Vegetation on Mineral Soil	1 (*11*)	2 (*7*)	0 (*1*)	1 (*19*)	1 (*44*)	1 (*1,105*)
Low Vegetation on Peatland	12 (*136*)	3 (*12*)	3 (*7*)	9 (*154*)	13 (*1,017*)	15 (*16,050*)
Regenerating Recent Burn on Mineral Soil	10 (*118*)	6 (*20*)	7 (*16*)	9 (*154*)	7 (*515*)	1 (*716*)
Regenerating Recent Burn on Peatland	44 (*512*)	57 (*197*)	45 (*105*)	46 (*814*)	35 (*2,684*)	7 (*7,477*)
Human Features	1 (*10*)	1 (*5*)	0 (*1*)	1 (*16*)	0 (*34*)	0 (*170*)
Total Area (ha)	***100 (1,176)***	***100 (347)***	***100 (234)***	***100 (1,758)***	***100 (7,664)***	***100 (108,162)***

[1] A value of 0 indicates a percentage that rounds to 0; a blank indicates that the type is absent.
[2] Reported values are calculated from the Habitat Mapping Area. Regional Study Area expected to have similar percentages.
[3] Not all broad habitat types are included. See Table B2-2 for priority habitat types with less than 50 ha total area in the Habitat Mapping Area. TA=trembling aspen; JP=jack pine; BS=black spruce; TL=tamarack.

Table B2-7: Forest Composition of the Project Study Areas as a Percentage of Total Forested Area[1]

Broad Habitat Type[3]	Project Footprint				LSA (includes Project Footprint)	Region[2]
	Borrow Area Zones	Infra-structure	Road	All		
TA Mixedwood on Mineral Soil	1 (*1*)	5 (*3*)		2 (*4*)	2 (*15*)	1 (*177*)
TA Mixture on Mineral Soil	2 (*3*)	8 (*5*)		3 (*8*)	1 (*8*)	1 (*110*)
JP Mixedwood on Mineral Soil	3 (*5*)			2 (*5*)	5 (*45*)	0 (*56*)
JP Mixture on Mineral Soil	9 (*12*)		21 (*6*)	8 (*18*)	11 (*100*)	1 (*248*)
JP Pure on Mineral Soil	1 (*1*)			1 (*1*)	1 (*9*)	0 (*59*)
JP Mixture on Peatland	1 (*2*)		9 (*2*)	2 (*4*)	2 (*18*)	1 (*90*)
BS Mixedwood on Mineral Soil	1 (*1*)			0 (*1*)	2 (*16*)	1 (*235*)
BS Mixture on Mineral Soil					0 (*1*)	0 (*1*)
BS Pure on Mineral Soil	15 (*21*)	62 (*36*)	22 (*6*)	28 (*63*)	19 (*182*)	26 (*4,404*)
BS Mixture on Peatland	9 (*12*)		13 (*4*)	7 (*16*)	4 (*39*)	5 (*924*)
BS Pure on Peatland	54 (*76*)	16 (*9*)	33 (*9*)	41 (*94*)	49 (*465*)	55 (*9,429*)
TL Mixture on Mineral Soil						0 (*61*)
TL Mixture on Peatland	0 (*1*)			0 (*1*)	0 (*2*)	3 (*461*)
Total Area (ha)	***100 (140)***	***100 (59)***	***100 (29)***	***100 (227)***	***100 (945)***	***100 (17,134)***

[1] A value of 0 indicates a percentage that rounds to 0; a blank indicates that the type is absent.
[2] Reported values are calculated from the Habitat Mapping Area. Regional Study Area expected to have similar percentages.
[3] TA=trembling aspen; JP=jack pine; BS=black spruce; TL=tamarack.

Table B2-8: Priority Habitat Types

Area and Percentage of Total Land Area[1] in the Study Areas

Priority Habitat Type	Abundance[3]	Region[2] Area (ha)	Area in Project Areas as Percentages of Region Area (ha in parentheses)	
			Project Footprint	LSA (includes Project Footprint)
Balsam poplar on all soils	V	*2*		50 (*1*)
Trembling aspen on all soils	V	*427*	4 (*16*)	8 (*32*)
White birch on all soils	V	*63*	4 (*3*)	7 (*4*)
Jack pine on outcrop	V	*11*		
Jack pine on mineral soils	V	*851*	5 (*47*)	29 (*244*)
Jack pine on peatlands	V	*265*	6 (*17*)	20 (*52*)
Black spruce mixedwood on mineral soils	V	*307*	1 (*4*)	8 (*24*)
Black spruce mixedwood on peatlands	V	*49*		10 (*5*)
Black spruce mixture on mineral soils	V	*854*	1 (*12*)	5 (*44*)
Black spruce mixture/ tall shrub on peatlands	V	*16*		
Black spruce on outcrop	V	*8*		
Black spruce, non-tamarack mixture on peatlands	V	*148*	8 (*13*)	15 (*22*)
Tamarack mixedwood on peatlands	V	*1*		
Tamarack mixture on mineral soils^	V	*93*		
Tamarack pure on mineral soils	V	*38*		
Tamarack pure on peatlands	V	*150*		0 (*0*)
Tamarack/ tall shrub on peatlands	V	*21*		
Tall shrub on mineral soils	V	*34*		
Tall shrub on peatlands	V	*898*	2 (*19*)	9 (*85*)
Low vegetation on aquatic peatlands in runnels	V	*810*	2 (*14*)	3 (*28*)
Low vegetation on collapse scar	V	*148*		3 (*4*)
Low vegetation on deep wet peat	V	*94*	0 (*0*)	1 (*1*)
Low vegetation on depressional aquatic peatlands	V	*429*	0 (*2*)	12 (*53*)
Low vegetation on depressional horizontal peatlands	V	*945*	1 (*10*)	10 (*91*)
Low vegetation on horizontal peatlands except depressions	V	*275*	1 (*4*)	2 (*7*)
Low vegetation on level aquatic peatlands	V	*852*	1 (*5*)	10 (*88*)
Low vegetation on outcrop	V	*16*		
Low vegetation on thin wet peat	V	*167*	1 (*1*)	3 (*5*)
Black spruce pure on mineral soils	U	*6,716*	1 (*82*)	4 (*267*)
Black spruce, tamarack mixture on peatlands^	U	*1,663*	1 (*21*)	4 (*69*)
Tamarack mixture on peatlands^	U	*1,115*	0 (*1*)	1 (*13*)
Low vegetation on depressional transition PPB	U	*1,770*	1 (*19*)	11 (*190*)
Low vegetation on remaining peatlands	U	*10,272*	1 (*91*)	5 (*533*)

[1] A value of 0 indicates a percentage that rounds to 0; a blank indicates that the type is absent.
[2] Reported values are calculated from the Habitat Mapping Area.
[3] Abundance: V= very uncommon- covers <= 1% of Sub-region land area; U= uncommon- covers >1% and <= 10% of Habitat Mapping Area.

Table B2-9: Wetland Composition of the Study Areas as a Percentage of Total Land Area (%(ha))[1]

Wetland Type	Project Footprint				LSA (includes Project Footprint)	Region[2]
	Borrow Areas	Infra-structure	Road	All		
Trembling aspen Mixedwood on Peatland					0 (*5*)	0 (*5*)
Trembling aspen Mixture on Peatland					0 (*5*)	0 (*5*)
Trembling aspen Pure on Peatland	0 (*0*)				0 (*0*)	0 (*0*)
Trembling aspen Mixedwood/ Tall shrub on Peatland					0 (*1*)	0 (*1*)
Trembling aspen Mixture/ Tall shrub on Peatland					0 (*2*)	0 (*2*)
Jack pine Mixedwood on Peatland	1 (*1*)			0 (*1*)		0 (*2*)
Jack pine Mixture on Peatland	0 (*0*)				0 (*0*)	0 (*0*)
Jack pine Pure on Peatland					0 (*0*)	0 (*0*)
Black spruce Mixedwood on Peatland				0 (*1*)	0 (*4*)	0 (*5*)
Black spruce Mixture on Peatland	0 (*0*)		7 (*0*)	2 (*7*)	3 (*149*)	3 (*156*)
Black spruce Mixture/ Tall shrub on Peatland					0 (*12*)	0 (*12*)
Tamarack Mixture on Peatland	0 (*0*)			2 (*5*)	8 (*361*)	7 (*367*)
Tamarack Mixture/ Tall shrub on Peatland				0 (*0*)	0 (*19*)	0 (*19*)
Tamarack Pure on Peatland				0 (*0*)	2 (*83*)	2 (*83*)
Tamarack Pure/ Tall shrub on Peatland					0 (*15*)	0 (*15*)
Tall shrubs on Peatland	16 (*12*)	9 (1)	14 (*0*)	15 (*44*)	14 (*622*)	14 (*679*)
Low vegetation on Peatland	42 (*31*)	49 (5)	10 (*0*)	79 (*238*)	72 (*3,313*)	72 (*3,587*)
Marsh and Other	40 (*30*)	42 (4)	70 (*0*)	2 (*5*)		1 (*40*)
Total Area (ha)	***100 (74)***	***100 (10)***	***100 (1)***	***100 (302)***	***100 (4,592)***	***100 (4,979)***

[1] A value of 0 indicates a percentage that rounds to 0; a blank indicates that the type is absent.
[2] Reported values are calculated from the Habitat Mapping Area. Regional Study Area expected to have similar percentages.

Table B2-10: Priority Plant Species Found During Field Studies					
Species		S-Rank	Number of locations		Total
Common Name	Scientific Name*		Local Study Area	Habitat Mapping Area	
Rare to Uncommon Species					
Oblong-leaved sundew	*Drosera anglica*	S3		3	3
Hairy butterwort	*Pinguicula villosa*	S3S4	10	22	32
Shrubby willow	*Salix arbusculoides*	S3		12	12
Rock willow	*Salix vestita*	S3		4	4
Range Limit Species					
Twining honeysuckle	*Lonicera dioica*	S5	1	0	1
Ground-pine	*Lycopodium dendroideum*	S5	1	0	1
Tufted bulrush	*Scirpus cespitosus*	S4	1	2	3
Hairy goldenrod	*Solidago hispida*	S5	2	7	9
All			15	50	65
*See Table B2-15 for full nomenclature.					

Table B2-11: Invasive and Non-native Plant Species Found During Field Studies			
Species		No. Locations	Invasive
Common Name	Scientific Name		
Ox-eye Daisy	*Chrysanthemum leucanthemum*	1	
Narrow-leaved hawks-beard	*Crepis tectorum*	1	
Wild barley	*Hordeum jubatum*	2	
Reed canary grass	*Phalaris arundinacea*	1	yes
Common plantain	*Plantago major*	1	
Common dandelion	*Taraxacum officinale*	3	
All		9	

Table B2-12: Project Footprint and Indirect Habitat Effects as Percentages of Regional Study Area			
Project/Study Area	**Project Footprint (%)**	**Indirect and Other Direct Habitat Effects (%)**	**Total (%)**
Road	0.02	0.03	0.06
Start-up Camp	0.00	0.00	0.00
Main Camp (Phase One)	0.03	0.01	0.04
Borrow G-1 Refined	0.01		0.01
Borrow G-5 Refined	0.00		0.00
Definite Project Footprints (sum of above areas)	0.07	0.05	0.12
Borrow Zone G-1 Outside Refined Area	0.07	0.02	0.08
Borrow Zone G-5 Outside Refined Area	0.03	0.01	0.04
Project Footprint (sum of above areas)	0.16	0.08	0.24
Local Study Area not including Project Footprint		0.47	0.47
Total % of Area	0.16	0.55	0.71

Table B2-13: Priority Habitat Types – Percentage and Area (*ha*) in the Project Areas Before and After Mitigation

Priority Habitat Type	Area (ha) in Habitat Mapping Area	Percentage and Area of Habitat Mapping Land Area* Affected Before Mitigation (%(ha))			Percentage and Area (*ha*) of Habitat Mapping Area[1] Affected After Mitigation[2]
		Project Footprint[2]	Potential Indirect Habitat and Other Direct Effects (150 m buffer)	Total	
Balsam poplar on all soils	*2*				
Trembling aspen on all soils*	*427*	4 (*16*)	1 (*3*)	4 (*19*)	2 (*10*)
White birch on all soils	*63*	5 (*3*)		5 (*3*)	3 (*2*)
Jack pine on outcrop	*11*				
Jack pine on mineral soils*	*851*	6 (*47*)	5 (*45*)	11 (*92*)	3 (*26*)
Jack pine on peatlands	*265*	6 (*17*)	6 (*15*)	12 (*32*)	2 (*5*)
Black spruce on outcrop	*8*				
Black spruce mixedwood on mineral soils	*307*	1 (*4*)	3 (*10*)	5 (*14*)	
Black spruce mixture on mineral soils	*854*	1 (*12*)	1 (*7*)	2 (*19*)	1 (*12*)
Black spruce mixedwood on peatlands	*49*		4 (*2*)	4 (*2*)	
Black spruce, non-tamarack mixture on peatlands	*148*	9 (*13*)	1 (*1*)	9 (*14*)	
Black spruce mixture/ tall shrub on peatlands	*16*				
Tamarack mixture on mineral soils	*93*				
Tamarack pure on mineral soils	*38*				
Tamarack mixedwood on peatlands	*1*				
Tamarack pure on peatlands	*150*				
Tamarack/ tall shrub on peatlands	*21*				
Tall shrub on mineral soils	*33*				
Tall shrub on peatlands	*895*	2 (*19*)	1 (*13*)	4 (*32*)	0 (*2*)
Low vegetation on outcrop	*16*				
Low vegetation on thin wet peat	*167*	1 (*1*)	1 (*1*)	1 (*2*)	
Low vegetation on deep wet peat	*94*				
Low vegetation on transition PPB in other topography	*284*	3 (*8*)	1 (*2*)	4 (*10*)	1 (*4*)
Low vegetation on collapse scar	*148*				
Low vegetation on depressional horizontal peatlands	*945*	1 (*10*)	0 (*3*)	1 (*13*)	
Low vegetation on horizontal peatlands except depressions	*275*	1 (*4*)	0 (*1*)	2 (*5*)	
Low vegetation on depressional aquatic peatlands	*429*	0 (*2*)	1 (*5*)	2 (*7*)	
Low vegetation on level aquatic peatlands	*847*	1 (*5*)	0 (*4*)	1 (*9*)	
Low vegetation on aquatic peatlands in other topography	*5*				
Low vegetation on aquatic peatlands in runnels	*810*	2 (*14*)	0 (*2*)	2 (*16*)	1 (*6*)

[1] A value of 0 indicates a percentage that rounds to 0; a blank indicates that the type is absent.

[2] Includes all of the borrow area zones.

* A habitat type that also generally also has high plant species diversity.

Table B2-14: Peatland Area in the Project Footprint as a Percentage of the Regional Study Area		
Project Component/Effect	**Percentage of RSA**	**Area (ha)**
Road	0.02	200
Camps	0.03	253
Borrow Area Zones	0.10	955
Road- Indirect Habitat Effects	0.03	272
Infrastructure- Indirect Habitat Effects	0.01	118
Borrow- Indirect Habitat Effects	0.03	281
Total	0.21	2,079

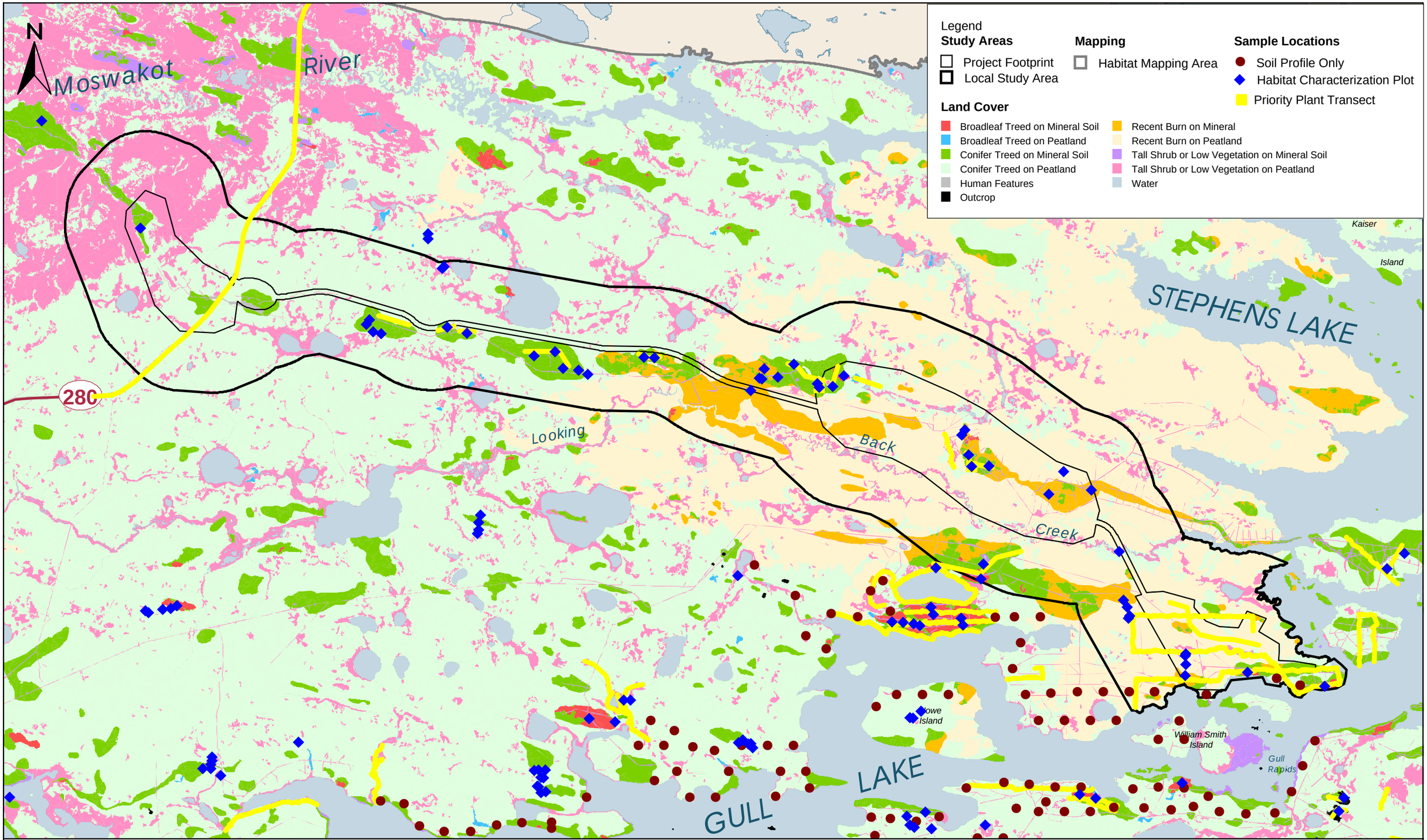
Table B2-15: Plant Species Found During Field Studies			
Scientific Name*	**Common Name**	**CDC S-Rank****	**Comments**
Vascular Plants			
Achillea millefolium L. var. *borealis* (Bong.) Farw.	Common Yarrow	S5	
Actaea rubra (Ait.) Willd.	Red Baneberry	S5	
Alnus viridis (Vill.) de Candolle subsp. crispa	Green Alder	S5	
Alnus incana (L.) Moench. subsp.rugosa	Speckled Alder	S5	
Andromeda polifolia L.	Bog Rosemary	S5	
Aralia nudicaulis L.	Wild Sarsaparilla	S5	
Arctostaphylos alpina (L.) Spreng. ssp. rubra	Alpine Bearberry	S5	
Arctostaphylos uva-ursi (L.) Spreng.	Bearberry	S5	
Aster ciliolatus Lindl.	Lindley's Aster	S5	
Betula papyrifera Marsh.	Paper Birch	S5	Also includes *B. neoalaskana* Sarg. in field data. Species are differentiated by twigs and leaves.
Betula pumila L. var. *glandulifera* Regel	Swamp Birch	S5	
Calamagrostis canadensis (Michx.) Nutt.	Reed Grass	S5	
Carex aquatilis Wahl.	Water Sedge	S5	
Carex argyrantha Tuckerm.	Sedge	SNA	Now known as *C. foenea* Willd. in FNA Vol 23
Carex concinna R. Br.	Beautiful Sedge	S4S5	
Carex deflexa Hornem.	Bent Sedge	S5	
Carex houghtoniana Torr.	Sand Sedge	S5	
Carex magellanica Lam.	Bog Sedge	S5	
Carex trisperma Dew.	Three-seeded Sedge	S5	
Chamaedaphne calyculata (L.) Moench	Leatherleaf	S5	
Chrysanthemum leucanthemum L.	Ox-eye Daisy	SNA	Introduced species
Corallorhiza trifida Chat.	Early Coralroot	S5	
Cornus canadensis L.	Bunchberry	S5	
Corydalis sempervirens (L.) Pers.	Pink Corydalis	S5	
Crepis tectorum L.	Narrow-leaved Hawk's-beard	SNA	Introduced species
Drosera rotundifolia L.	Round-leaved Sundew	S5	
Epilobium angustifolium L.	Fireweed	S5	
Equisetum arvense L.	Common Horsetail	S5	
Equisetum scirpoides Michx.	Dwarf Scouring-rush	S5	
Equisetum sylvaticum L.	Woodland Horsetail	S5	
Fragaria virginiana Dcne.	Smooth Wild Strawberry	S5	
Galium trifidum L.	Bedstraw	S5	
Geocaulon lividum (Richards.) Fern.	Northern Comandra	S5	
Hordeum jubatum L.	Foxtail Barley	S5	
Kalmia polifolia Wang.	Pale Bog-laurel	S5	
Larix laricina (Du Roi) Koch	Tamarack	S5	
Ledum groenlandicum Oeder.	Labrador Tea	S5	
Linnaea borealis L.	Twinflower	S5	
Lonicera dioica L.	Twining Honeysuckle	S5	
Lycopodium annotinum L.	Stiff Clubmoss	S5	

Table B2-15: Plant Species Found During Field Studies			
Scientific Name*	**Common Name**	**CDC S-Rank****	**Comments**
Lycopodium complanatum L.	Ground-cedar	S5	
Lycopodium dendroideum Michx.	Ground-pine	S5	
Menyanthes trifoliata L.	Bogbean	S5	
Mertensia paniculata (Ait.) Don	Tall Lungwort	S5	
Mitella nuda L.	Bishop's Cap	S5	
Petasites palmatus (Ait.) Gray	Palmate-leaved Coltsfoot	S5	
Picea glauca (Moench.) Voss	White Spruce	S5	
Picea mariana (Mill.) BSP	Black Spruce	S5	
Pinguicula villosa L.	Hairy Butterwort	S3S4	
Pinus banksiana Lamb.	Jack Pine	S5	
Plantago major L.	Common Plantain	SNA	Introduced species
Platanthera hyperborea (L.) Lindl.	Northern Green Bog-orchid	SNA	
Populus balsamifera L.	Balsam Poplar, Black Poplar	S5	
Pyrola asarifolia Michx.	Common Pink Wintergreen	S5	
Pyrola grandiflora Radius	Arctic Wintergreen	S4	
Pyrola secunda L.	One-sided Wintergreen	S5	
Pyrola virens Schweigg.	Green-flowered Wintergreen	S5	
Rhamnus alnifolia L'Her.	Alder-leaved Buckthorn	S5	
Ribes glandulosum Grauer	Skunk Currant	S5	
Ribes hudsonianum Richards.	Northern Wild Black Currant	S5	
Ribes lacustre (Pers.) Poir.	Bristly Black Currant	S4	
Ribes oxyacanthoides L.	Bristly Wild Gooseberry	S5	
Ribes triste Pall.	Wild Red Currant	S5	
Rosa acicularis Lindl.	Prickly Rose	S5	
Rubus acaulis Michx.	Stemless Raspberry	S5	
Rubus chamaemorus L.	Cloudberry	S5	
Rubus idaeus L.	Raspberry	S5	
Rubus pubescens Raf.	Dewberry	S5	
Salix bebbiana Sarg.	Bebb's Willow	S5	
Salix myrtillifolia Anderss.	Low Blueberry Willow	S5	
Salix pellita Anderss.	Satin Willow	S4	
Salix planifolia Pursh.	Plane-leaved Willow	S5	
Scheuchzeria palustris L.	Pod Grass	S4?	
Scirpus cespitosus L.	Tufted Bulrush	S4	
Shepherdia canadensis (L.) Nutt.	Soapberry	S5	
Smilacina trifolia (L.) Desf.	Three-leaved Solomon's Seal	S5	
Solidago hispida Muhl.	Goldenrod	S5	
Taraxacum officinale Weber.	Common Dandelion	S5	
Vaccinium myrtilloides Michx.	Velvet-leaf Blueberry	S5	
Vaccinium oxycoccus L.	Small Bog Cranberry	S5	
Vaccinium uliginosum L.	Bog Bilberry	S5	
Vaccinium vitis-idaea L.	Dry-ground Cranberry	S5	
Viburnum edule (Michx.) Raf.	Low-bush Cranberry	S5	
Viola renifolia Gray	Kidney-shaped Violet	S5	
Mosses and Lichens Identified to Species in the Field			
Hylocomium splendens	Stair step moss		

Table B2-15: Plant Species Found During Field Studies			
Scientific Name*	**Common Name**	**CDC S-Rank****	**Comments**
Pleurozium schreberi	Schreber's moss		
Ptilium crista-castrensis			
Cladina mitis			
Cladina rangiferina			
Cladina stellaris			

* Nomenclature follows Flora of North America (FNA) where volumes currently exist for the genus and the Manitoba Conservation Data Centre elsewhere.

** CDC Ranking Codes: S1= Very rare throughout its range or in the province. May be especially vulnerable to extirpation., S2= Rare throughout its range or in the province. May be vulnerable to extirpation., S3=Uncommon, S3S4 and S3?= Uncommon to apparently secure, S4= Widespread, abundant, and apparently secure throughout its range or in the province, with many occurrences, but the element is of long-term concern, S5= Demonstrably widespread, abundant, and secure throughout its range or in the province, and essentially irradicable under present conditions, SNA= A conservation status rank is not applicable to the element; ?= Inexact; S#S#= A range between two of the numeric ranks. Denotes range of uncertainty about the exact rarity of the specie.



KEEYASK

0 1 2 4 Kilometres
0 0.5 1 2 Miles

Projection: UTM NAD 83, Zone 15
Data Sources: Sample Locations, Study Areas, Nelson River and Highway 280 - ECOSTEM Ltd.; Impact Areas- MB Hydro.
Created by: ECOSTEM Ltd.
Date Created: July 15, 2009

Sample Locations (2002 - 2008) on Land Cover

Figure B2-1

Appendix B3

Terrestrial Bird Information

BIRDS APPROACH AND METHODS

Breeding-Bird Survey Methods

To provide baseline information on bird abundance and habitat use in the Keeyask Infrastructure Project area, bird surveys were conducted in 2004 and 2005 within the Project area including the vicinity of the main camp (phase one) and adjacent to the proposed road ROW:

- Transect locations were preselected within major habitat types (black spruce and jack pine) using available plant community and habitat data including Forest Resource Inventory (FRI), aerial photography and data collected during previous surveys:
  - Breeding-bird survey transect sites were located in representative habitat areas, with each transect placed within the largest areas of continuous (i.e., homogenous) habitat.
  - Where preselected sampling sites fell within habitat that did not match the interpretation of FRI and aerial photography (e.g., area had since been burned), nearby alternative transect sites were selected in the field and sampled.
- Sampling occurred at stops located at 150-m intervals along predetermined line transects (Figure B3-1):
  - The number of stops per transect ranged from 5 to 29.
  - Adjacent to the proposed ROW, breeding-bird survey transects were located on and parallel to the preferred access road route at 150-, 300- and 450-m intervals (Figure B3-2). Some additional survey points were oriented in a linear fashion extending outward (E-W) from the original survey grids (Figure B3-3).
  - Near the Construction Camp (Phase 1) site, survey transects were laid out in a linear orientation within areas expected to be affected by the Project.
  - Two biologists identified and recorded birds and other wildlife (e.g., amphibians) by sound and/or sight within a 75-m radius at each stop.
  - Bird surveys occurred during peak singing times, between sunrise and 11 a.m.
  - Coordinates for each transect stop were recorded using a GPS unit.
  - Other data such as habitat description information, time, date and weather conditions were also recorded.
  - Photographs of habitat were taken at representative transect stops.
- The data were analyzed in relationship to habitat groupings developed by the study team (Figure 3.4-1).

HELICOPTER RECONNAISSANCE METHODS

Helicopter reconnaissance took place at the lakes and ponds that are located near the access road route (Figure B3-2). These waterbodies were overflown to assess waterbird usage in the vicinity of the access road. One lake in particular ("A" on Figure B3-2) was identified as being an area of consistent waterbird usage in relatively close proximity to the access road route.

- loss of in-stream and riparian aquatic habitats affecting productive capacity of fish habitat.

Table B3-1: Terrestrial Invertebrate Overview: Phyla, Class and Order of Terrestrial Invertebrates

Phylum	Class	Order	Common Name	Ecological Significance
Nematoda			Round worms, thread worms (some), whip worms, lung worms, hook worms, eel worms	Predators, decomposers, parasites
Annelida			Leeches, earthworms	Decomposers, parasites
Mollusca			slugs, land snails	Scavengers, decomposers, predators
Arthropoda	Malacostraca	Isopoda	Isopods, pillbugs, woodlice	Decomposers
	Arachnida		Mites, ticks, spiders, scorpions	Parasites, predators
	Chilopoda		Centipedes	Predators
	Diplopoda		Millipedes	Decomposers, herbivores
	Entognatha	Collembola	Springtails	Decomposers, herbivores
	Insecta	Coleoptera	Beetles	Scavengers, predators, herbivores
		Dermaptera	Earwigs	Omnivores, decomposers
		Diptera	Mosquitoes, gnats, midges	Parasites, nectivores
		Hymenoptera	Wasps, ants, bees, sawflies	Predators, nectivores, herbivores
		Lepidoptera	Butterflies, moths	Nectivores
		Orthoptera	Grasshoppers, crickets, katydids, locusts	Herbivores
		Thysanura	Bristletails, silverfish	Decomposers, herbivores

Source: BIOSIS Zoological Record (2007)

Table B3-2: Birds Potentially Using the Local Study Area					
Species	Observed in Study Area During 2004/2005 Surveys	Breeding or Migrating?	Regulatory Status*		
			SARA (Schedule 1)	MBESA	COSEWIC
Pacific Loon	✓	Migrating			
Common Loon	✓	Breeding			
Pied-billed Grebe		Breeding			
Horned Grebe		Breeding			Special Concern
Red-necked Grebe	✓	Breeding			
American White Pelican		Breeding			
Double-crested Cormorant	✓	Breeding			
American Bittern		Breeding			
Great Blue Heron	✓	Breeding			
Tundra Swan	✓	Migrating			
Greater White-fronted Goose		Migrating			
Snow Goose		Migrating			
Ross's Goose		Migrating			
Canada Goose	✓	Breeding			
Green-winged Teal	✓	Breeding			
American Black Duck	✓	Breeding			
Mallard	✓	Breeding			
Northern Pintail	✓	Breeding			
Blue-winged Teal	✓	Breeding			
Northern Shoveller	✓	Breeding			
Gadwall		Breeding			
American Wigeon	✓	Breeding			
Canvasback		Breeding			
Redhead		Breeding			
Ring-necked Duck	✓	Breeding			
Greater Scaup	✓	Migrating			
Lesser Scaup	✓	Breeding			
Common Eider		Migrating			
Black Scoter	✓	Migrating			
Surf Scoter	✓	Migrating			
White-winged Scoter	✓	Breeding			
Common Goldeneye	✓	Breeding			
Bufflehead	✓	Breeding			
Hooded Merganser	✓	Breeding			
Common Merganser	✓	Breeding			
Red-breasted Merganser	✓	Breeding			
Osprey	✓	Breeding			
Bald Eagle	✓	Breeding			
Northern Harrier	✓	Breeding			
Sharp-shinned Hawk	✓	Breeding			

Table B3-2: Birds Potentially Using the Local Study Area					
Species	Observed in Study Area During 2004/2005 Surveys	Breeding or Migrating?	Regulatory Status*		
			SARA (Schedule 1)	MBESA	COSEWIC
Northern Goshawk	✓	Breeding			
Red-tailed Hawk	✓	Breeding			
Rough-legged Hawk		Migrating			
Golden Eagle		Breeding			
American Kestrel		Breeding			
Merlin	✓	Breeding			
Peregrine Falcon		Migrating	Threatened	Endangered	Special Concern
Gyrfalcon		Migrating			
Spruce Grouse	✓	Breeding			
Willow Ptarmigan		Breeding			
Ruffed Grouse	✓	Breeding			
Sharp-tailed Grouse		Breeding	Special Concern		Special Concern
Yellow Rail		Breeding			
Sora		Breeding			
American Coot		Breeding			
Sandhill Crane	✓	Breeding			
Black-bellied plover		Migrating			
Lesser golden-Plover		Migrating			
Semipalmated Plover		Migrating			
Killdeer		Breeding			
Greater Yellowlegs	✓	Breeding			
Lesser Yellowlegs	✓	Breeding			
Solitary Sandpiper		Breeding			
Spotted Sandpiper	✓	Breeding			
Hudsonian Godwit		Migrating			
RuddyTurnstone		Migrating			
Red Knot		Migrating			
Sanderling		Migrating			
Semipalmated Sandpiper		Migrating			
Least Sandpiper		Migrating			
White-rumped Sandpiper		Migrating			
Baird's Sandpiper		Migrating			
Pectoral Sandpiper		Migrating			
Dunlin		Migrating			
Short-billed Dowitcher		Breeding			
Wilson's Snipe	✓	Breeding			
Red-necked Phalarope		Migrating			
Parasitic Jaeger		Breeding			
Bonaparte's Gull	✓	Breeding			
Ring-billed Gull	✓	Breeding			
Herring Gull	✓	Breeding			

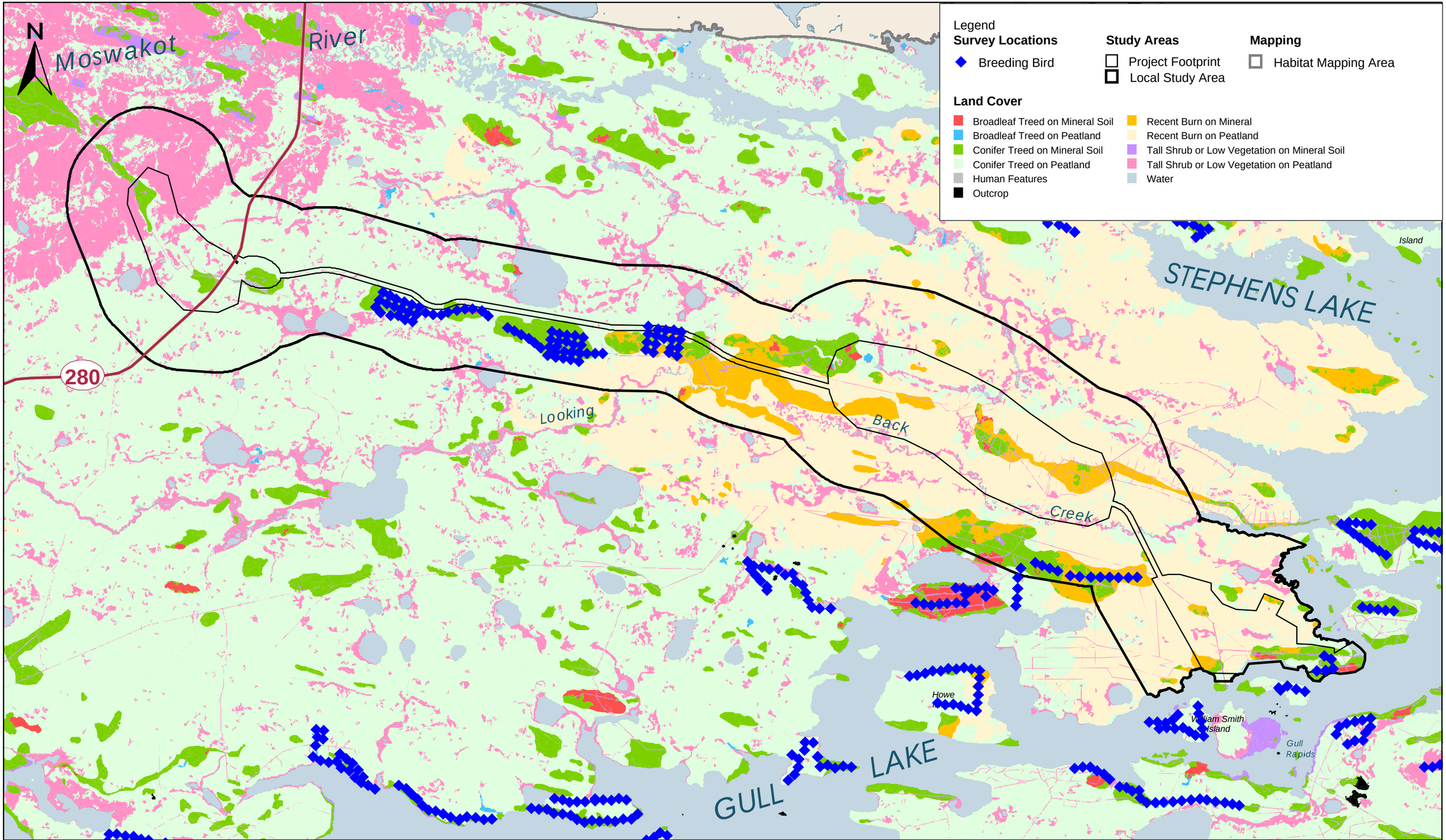
Table B3-2: Birds Potentially Using the Local Study Area					
Species	Observed in Study Area During 2004/2005 Surveys	Breeding or Migrating?	Regulatory Status*		
			SARA (Schedule 1)	MBESA	COSEWIC
Caspian Tern	✓	Breeding			
Common Tern	✓	Breeding			
Arctic Tern		Migrating			
Black Tern		Breeding			
Great Horned Owl		Breeding			
Snowy Owl		Migrating			
Northern Hawk-Owl		Breeding			
Great Gray Owl		Breeding			
Long-eared Owl		Breeding			
Short-eared Owl		Breeding			Special Concern
Boreal Owl		Breeding			
Common Nighthawk		Breeding			Threatened
Ruby-throated Hummingbird		Breeding			
Belted Kingfisher	✓	Breeding			
Yellow-bellied Sapsucker		Breeding			
Downy Woodpecker		Breeding			
Hairy Woodpecker	✓	Breeding			
Three-toed Woodpecker	✓	Breeding			
Black-backed Woodpecker		Breeding			
Northern Flicker	✓	Breeding			
Pileated Woodpecker		Breeding			Threatened
Olive-sided Flycatcher	✓	Breeding			
Yellow-bellied Flycatcher	✓	Breeding			
Alder Flycatcher	✓	Breeding			
Least Flycatcher	✓	Breeding			
Eastern Phoebe		Breeding			
Eastern Kingbird		Breeding			
Horned Lark		Breeding			
Tree Swallow	✓	Breeding			
Bank Swallow		Breeding			
Cliff Swallow	✓	Breeding			
Barn Swallow		Breeding			
Gray Jay	✓	Breeding			
American Crow	✓	Breeding			
Common Raven	✓	Breeding			
Boreal Chickadee	✓	Breeding			
Red-breasted Nuthatch	✓	Breeding			
Winter Wren	✓	Breeding			
Golden-crowned Kinglet	✓	Breeding			
Ruby-crowned Kinglet	✓	Breeding			
Gray-cheeked Thrush	✓	Migrating			
Swainson's Thrush	✓	Breeding			

Table B3-2: Birds Potentially Using the Local Study Area					
Species	Observed in Study Area During 2004/2005 Surveys	Breeding or Migrating?	Regulatory Status*		
			SARA (Schedule 1)	MBESA	COSEWIC
Hermit Thrush	✓	Breeding			
American Robin	✓	Breeding			
Water Pipit	✓	Migrating			
Bohemian Waxwing		Breeding			
Cedar Waxwing	✓	Breeding			
Northern Shrike		Migrating			
European Starling		Breeding			
Blue-headed Vireo	✓	Breeding			
Philadelphia Vireo		Breeding			
Red-eyed Vireo	✓	Breeding			
Tennessee Warbler	✓	Breeding			
Orange-crowned Warbler	✓	Breeding			
Yellow Warbler	✓	Breeding			
Magnolia Warbler	✓	Breeding			
Cape May Warbler	✓	Breeding			
Yellow-rumped Warbler	✓	Breeding			
Blackburnian Warbler	✓	Breeding			
Palm Warbler	✓	Breeding			
Bay-breasted Warbler		Breeding			
Blackpoll Warbler	✓	Breeding			
Black-and-white Warbler		Breeding			
Ovenbird	✓	Breeding			
Northern Waterthrush	✓	Breeding			
Wilson's Warbler	✓	Breeding			
Rose-breasted Grosbeak	✓	Breeding			
American Tree Sparrow		Breeding			
Chipping Sparrow	✓	Breeding			
Clay-colored Sparrow		Breeding			
Vesper Sparrow		Breeding			
Savannah Sparrow	✓	Breeding			
Le conte's Sparrow		Breeding			
Fox Sparrow	✓	Breeding			
Song Sparrow	✓	Breeding			
Lincoln's Sparrow	✓	Breeding			
Swamp Sparrow	✓	Breeding			
White-throated Sparrow	✓	Breeding			
White-crowned Sparrow		Breeding			
Harris's Sparrow		Migrating			
Dark-eyed Junco	✓	Breeding			
Lapland Longspur		Migrating			
Smith's Longspur		Migrating			
Snow Bunting	✓	Migrating			

Table B3-2: Birds Potentially Using the Local Study Area					
Species	**Observed in Study Area During 2004/2005 Surveys**	**Breeding or Migrating?**	**Regulatory Status***		
			SARA (Schedule 1)	**MBESA**	**COSEWIC**
Red-Winged Blackbird	✓	Breeding			
Rusty Blackbird	✓	Breeding	Special Concern		Special Concern
Common Grackle	✓	Breeding			
Pine Grosbeak	✓	Breeding			
Red Crossbill	✓	Breeding			
White-winged Crossbill		Breeding			
Common Redpoll	✓	Breeding			
Hoary Redpoll		Migrating			
Pine Siskin		Breeding			
House Sparrow		Breeding			
*SARA – *Species at Risk Act*; MESA = *The Endangered Species Act* (Manitoba); COSEWIC = Committee on the Status of Endangered Wildlife in Canada (no 'regulatory status' per se, however, COSEWIC-listed species are reviewed for inclusion under SARA); Blank cell = no regulatory status					

Table B3-3: Most Common Bird Species Observed Within Habitat Groups Surveyed in the Local Study Area											
Most Common Songbirds Observed	Ranking[a] of the Five Most Common Birds Observed Within Habitat Groups Surveyed (2001 to 2007)[b]										
	Population Trend in the Boreal Softwood Shield[c]	Black Spruce Forest	Black Spruce Woodland	Sparsely Treed Black Spruce or Black Spruce/ Tamarack Mixture	Spruce Mixture Forest	Spruce Mixture Woodland	Jack Pine Mixture Forest or Woodland	Jack Pine Forest or Woodland	Spruce Mixedwood Forest or Woodland	White Birch Mixedwood Forest or Woodland	Trembling Aspen Mixedwood Forest or Woodland
Ruby-crowned Kinglet	0.0	2	1	1	1	1	1	4	2	2	1
Yellow-rumped Warbler	0.4	1	2	2	2	2	3	2	1	1	2
Northern Waterthrush	0.2	4	3	3	4	5	4	4	-	-	-
Swainson's Thrush	0.2	5	4	-	5	4	-	1	3	5	-
White-throated Sparrow	-0.2	-	-	-	3	5	2	-	5	-	-
American Robin	0.7	3	-	4	-	-	4	-	4	-	4
Blue-headed Vireo	-2.8	-	-	-	-	-	-	-	-	3	3
Dark-eyed Junco	1.2	-	5	5	-	-	-	-	-	-	-
Magnolia Warbler	-2.3	-	-	-	-	-	-	3	-	-	-
Tennessee Warbler	-1.5	-	-	-	-	-	-	-	-	4	-
Winter Wren	0.9	-	-	-	-	-	-	4	-	-	-
Gray Jay	-1.4	-	-	-	-	-	4	-	-	-	-
Yellow Warbler	0.9	-	-	-	-	-	-	-	-	-	5

a = Ranking: 1 = first most common bird species, to 5 = fifth most common bird species ('most common' = species observed at the most number of survey stops)
b = Refer to Section 3.4.1 for definitions of 'forest', 'woodland', 'mixture' and 'mixedwood'
c = Data from 1968-2007. Source: CWS Bird Trends Database accessed at: http:/www.cws-sce.ec.gc.ca/mgbc/trends.
Trend = mean annual percentage change in bird population. None of the trends shown here are statistically significant $P<0.05$ or $0.05 <P<0.1$



KEEYASK

0 1 2 4 Kilometres
0 0.5 1 2 Miles

Projection: UTM NAD 83, Zone 15
Data Sources: Survey Locations - TetrES; Study Areas, Nelson River and Highway 280 - ECOSTEM Ltd.; Impact Areas- MB Hydro.
Created by: ECOSTEM Ltd.
Date Created: July 15, 2009

Breeding Bird Survey Locations (2001-2007) and Land Cover Types in the Study Area

Figure B3-1

N

PROPOSED LOCATION
OF START-UP CAMP

A

Linear Extensions
off Transect Grids

Proposed Road

Looking Back Creek

Ross Wright Bay

O'NEIL

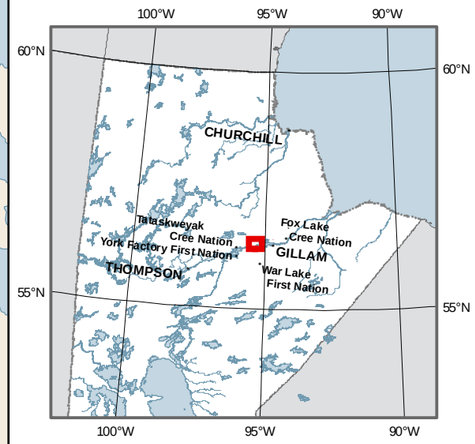
MAIN CAMP
(PHASE ONE)

Gull Rap

NELSON RIVER

PROPOSED
KEEYASK GS

GULL LAKE



Legend

- Main Camp (Phase One)
- Infrastructure (Footprint)
- 100m Rights-of Way
- Breeding Bird Survey Stops Along Transect Lines
- Lake Reconnaissance Area (via Helicopter)

Projection: NAD 83, UTM Zn15N
Data Source: Government of Canada, Manitoba Hydro, TetrES Consultants Inc.
Created By: TetrES Consultants Inc.
Date: July 24, 2009

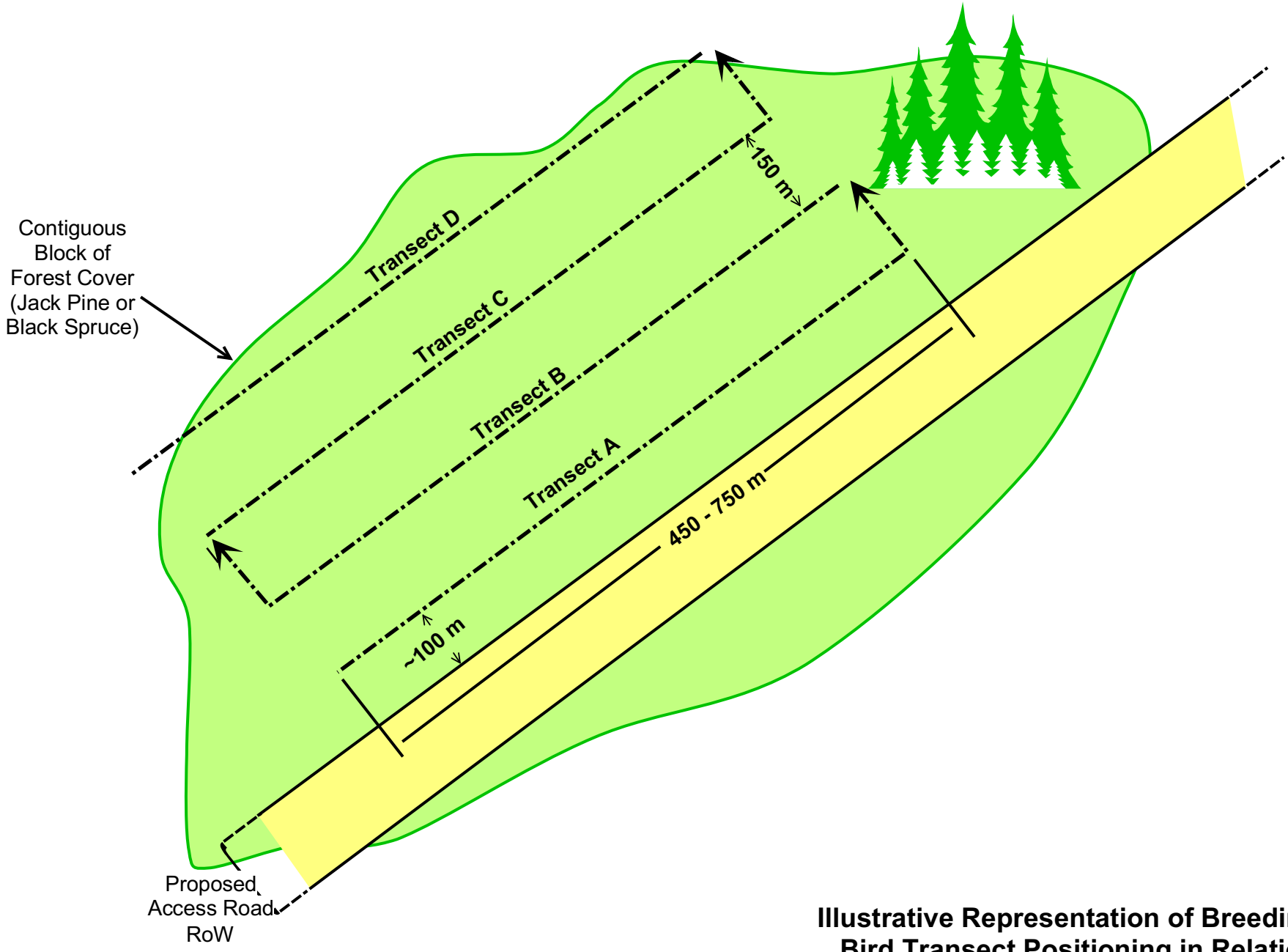
0 1 2 4 km
0 0.5 1 2 mi

Lake Reconnaissance Areas and Breeding Bird Survey Transect Locations, 2004 & 2005

KEEYASK

G:_GIS_Project_Folder\0221-Hydro\63_Keeyask_Road\ArcMaps\BBS_Lk_Recon_150709.mxd - 7/24/2009 @ 12:00:58 PM

Figure B3-2



Illustrative Representation of Breeding Bird Transect Positioning in Relation to Access Road Right-of-Way

Figure B3-3

RoWtrans3
ms\01\0221\29

Not exactly to scale.

Appendix B4

Mammals Information

MAMMALS APPROACH AND METHODS

Studies focused on priority mammal species that were selected using the following criteria; the importance of a species to local peoples, regulatory requirement, role in ecosystem function, whether it can be used as an indicator, whether there are sufficient scientific data, whether the animal is common or rare, and whether there is the potential for substantial effects from the project. Priority mammal selections included beaver, caribou (with descriptions of barren-ground, coastal and potential woodland ecotypes), moose, wolverine, raccoon, and porcupine. Other mammals of interest in the study area include muskrat, river otter, meadow vole, American marten, red fox, snowshoe hare, red-backed vole, gray wolf, coyote, black bear, and mink. Refer to Appendix B4-1, Table B4-1 for a list of scientific names and of those mammal species potentially using the Keeyask region.

Studies completed focused on the local and regional habitat-based scales near the proposed road. Studies included comparison areas. Some studies conducted in 2001 were suspended in 2002 due to poor conditions (i.e. aerial surveys). These studies were renewed in 2003 and continued until the end of the study in 2006.

Aerial Surveys

Aerial surveys were conducted to determine the presence, distribution, and relative abundance of certain mammal species across the landscape using representative habitat types and to identify and measure priority species and its habitats in focused areas of interest. Beaver lodges and food caches, muskrat push-up counts, moose counts and caribou counts were also used in some cases to index local and regional populations.

Ungulate Studies

Aerial surveys for ungulates (moose and caribou) were conducted in the winters of 2002 to 2006 (Figure B4-1). Ungulate counts included observations of individuals as well as signs of their presence (e.g. tracks and feeding craters) (Schemnitz 1980, Elzinga *et al.* 2001, Braun 2005). Surveys typically consisted of both reconnaissance trajectories and township-sized flight blocks. The reconnaissance trajectories were designed to locate ungulate populations, particularly caribou using a random flight pattern towards or bisecting expected movement patterns. The township flight blocks were designed to determine ungulate densities throughout the surveyed areas and consisted of linear transects flowing from north to south, covering 15 to 100% of the block. The line of sight was estimated at 200 m on either side of the aircraft.

Ungulate observations were calculated as linear frequencies (individuals/km) for both types of ungulate surveys. Densities were also calculated for township block portions as individuals/km^2. Overall density was calculated from the mean density across each block sampled in a given survey period, then averaged across all survey periods. Summary results are reported for caribou and moose in Table B4-2 and Table B4-3, respectively.

Aquatic Furbearer Studies

Aerial surveys for aquatic furbearers (beaver and muskrat) were conducted along watercourses and water bodies in the spring and fall of 2001 and 2003, and in the spring of 2006. The number of beaver lodges, food caches, and dams and muskrat push-ups along water bodies of varying sizes were counted, positions were marked using a GPS, and were classed as either active or inactive (Schemnitz 1980, Elzinga *et al.* 2001, Braun 2005). This information was then analyzed using a geographical information system (GIS), where waterbodies greater then 0.5 km^2 were considered lakes while those less then 0.5 km^2 were considered ponds. The Assean, Split, Clark, and Stephens lakes were classified as one type of water body. Rivers were depicted by a dual polyline on a 1:50,000 topographic map; creeks were depicted by a single line. The Nelson River was the only river named in the study. Summary results are reported for beaver in Table B4-4. Survey locations, beaver lodges and muskrat push-ups are presented in Figure B4-2.

Mammal Sign (Tracking) Surveys

Mammal sign surveys were conducted to determine the presence, distribution, and relative abundance of mammal species across the landscape using representative habitat types and to identify rare species in the area, particularly those listed as threatened or endangered under *The Endangered Species Act* (Manitoba) or the Federal *Species at Risk Act* (SARA).

Sign survey studies (Schemnitz 1980, Elzinga *et al.* 2001, Braun 2005) were conducted in the summers of 2001 to 2005 in the areas around Gull Lake and Stephen's Lake (Figure B4-3). Most studies conducted in the Local Study Area from 2003 to 2005 replicated or expanded upon those conducted in 2001 and 2002. These surveys were conducted in summer, fall and winter. Mammal observations and signs were recorded by local and experienced trackers, and an estimate of relative abundance of the species in various habitat types and locations throughout the study area was generated.

Seven general types of mammal sign surveys were conducted in the Gull Lake area including 500 m transect surveys, north and south trail surveys, rare community surveys, access road surveys, riparian shoreline surveys, lake perimeter surveys, and island reconnaissance surveys. Mammal signs were recorded along the length of each transect and included scat, tracks, trails, browse and feeding sites, and shelters. Transects were selected to be representative of broad habitat types in the local and regional areas of interest. Of the 33 identified broad habitat types, seven types composed greater then 96% of the landscape. Twenty seven habitat types were sampled during the ground tracking surveys while seven broad habitat types were not surveyed as they were very rare in the study area and did not occur in the specific areas of interest for mammal tracking. Riparian shoreline and lake perimeter surveys were excluded from this assessment.

Sign abundance was the basis for which mammal community composition and relative abundance were assessed and was measured using sign frequency and proportion of transects. Sign frequency was calculated as the mean number of sign per 100 m^2 on each transect, averaged across all transects sampled for any given species or study area unit and was used for transect-based surveys. Proportion of transects was calculated as the number of transects on which a species was detected and was used

to measure species distribution. Island reconnaissance surveys collected presence/absence data for caribou and moose.

Results of tracking surveys are summarized by habitat type in Tables B4-5, B4-6 and B4-7. Locations of summer caribou observations in the Habitat Mapping Area are presented by transect in Figure B4-4. Locations of summer moose observations in the Habitat Mapping Area are presented by transect in Figure B4-5.

Small Mammal Trapping Program

Small mammal trapping blocks were established in the Local Study Area and surrounding region in 2001, and were trapped until 2004. Small mammals captured were weighed, measured, and positively identified by dental characteristics (Schemnitz 1980, Elzinga *et al.* 2001, Braun 2005). The small mammal trapping program was designed to estimate the occurrence, abundance, and distribution of small mammals and to compare small mammal abundance between riparian and terrestrial habitats. Summaries of small mammal species and numbers are reported in Table B4-8.

Trap blocks were established in Stephens Lake and Gull Lake, each consisting of 100 traps, typically divided into two groups of 50 traps of equal numbers of Victor and Museum Special snap-traps. Trapping locations included riparian and upland habitats. Approximately 300 m separated habitat trap blocks from riparian areas. Traps were set and checked and reset daily of over a four day period, with some exceptions due to weather.

The skulls of captured animals were collected and processed using insect digestion and enzyme bath defleshing methods and then identified to *species* when possible, or to *genus* when not possible. Captured mammals were weighed (within 0.1 g), tail and body length (mm) were measured, and sex was recorded. Deer mice were not measured or handled due to the potential risk of exposure to Hantavirus.

Other Data

Licensed moose harvest data returns (Manitoba Conservation 1993-2007 unpubl. data) are presented in Table B4-9 by Game Hunting Area (GHA). The distribution of GHA in proximity to the Regional Study Area is presented in Figure B4-6.

Trapline return summary data (Manitoba Conservation 1961-1984 unpubl. data) are presented in Table B4-10.

Table B4-1: Mammal Species Potentially Using the Local Study Area						
Common Name	**Scientific Name**	**Aerial Surveys**	**Ground Surveys**	**Mammal Trapping**	**Provincial Trapping Records**	**Incidental Observations**
Masked Shrew	*Sorex cinereus*			✓		
Water Shrew	*Sorex palustris*			✓		
Arctic Shrew	*Sorex arcticus*			✓		
Pygmy Shrew	*Sorex hoyi*			✓		
Snowshoe Hare	*Lepus americanus*		✓			
Least Chipmunk	*Tamias minimus*		✓	✓		
Woodchuck	*Marmota monax*					✓
Red Squirrel	*Tamiasciurus hudsonicus*		✓	✓	✓	
Northern Flying Squirrel	*Glaucomys sabrinus*					✓
Beaver	*Castor canadensis*	✓	✓		✓	
Deer Mouse	*Peromyscus maniculatus*			✓		
Gappers Red-backed Vole	*Clethrionomys gapperi*			✓		
Northern Bog Lemming	*Synaptomys borealis*			✓		
Heather Vole	*Phenacomys intermedius*			✓		
Muskrat	*Ondatra zibethicus*	✓	✓		✓	
Meadow Vole	*Microtus pennsylvanicus*			✓		
Meadow Jumping Mouse	*Zapus hudsonius*			✓		
Coyote	*Canis latrans*		✓		✓	
Gray Wolf	*Canis lupus*	✓	✓		✓	
Arctic Fox	*Alopex lagopus*				✓	
Red Fox	*Vulpes vulpes*		✓		✓	
Black Bear	*Ursus americanus*		✓		✓	
Raccoon	*Procyon lotor*		✓		✓	
Pine Marten	*Martes americana*		✓		✓	
Fisher	*Martes pennanti*		✓		✓	
Mink	*Mustela vison*		✓		✓	
Wolverine	*Gulo gulo*		✓		✓	
River Otter	*Lontra canadensis*		✓		✓	
Lynx	*Lynx lynx*		✓		✓	
Ermine	*Mustela erminea*				✓	
Weasel	*Mustela spp.*		✓		✓	
Caribou	*Rangifer tarandus*	✓	✓			
Moose	*Alces alces*	✓	✓			

Table B4-2: Results of Caribou Aerial Surveys in the Region[1] (2002-2006)					
Study Year	**No. Observed**	**Area Covered (km²)**	**Density (km²)**	**Minimum**	**Maximum**
2002	24	450	0.05	0	0.14
2003	347	1,022	0.34	0	2.24
2004	146	458	0.32	0	1.72
2005	8	269	0.03	0	0.3
2006	16	189	0.08	0	0.44
Total	**541**	**2,388**	**0.23**	**0**	**2.24**

Table B4-3: Results of Moose Aerial Surveys in the Region (2002-2006)					
Study Year	**No. Observed**	**Area Covered (km²)**	**Density (km²)**	**Minimum**	**Maximum**
2002	12	450	0.03	0	0.09
2003	91	1,022	0.09	0.03	0.26
2004	44	458	0.10	0	0.38
2005	38	269	0.14	0.04	0.77
2006	27	189	0.14	0	0.62
Total	**212**	**2,388**	**0.09**	**0**	**0.77**

Table B4-4: Results of Beaver Lodge Aerial Surveys in the Habitat Mapping Area[2]			
Water Type	**Distance (km)**	**No. of Lodges**	**Mean Lodge Density (lodges/km)**
Lakes	1,062	175	0.16
Lake- Assean	148	3	0.02
Lake- Clark	68	3	0.04
Lake- Split	3,763	21	0.01
Lake- Stephens	2,561	15	0.01
Ponds	447	215	0.48
Rivers	388	43	0.11
River- Nelson Central	1,430	8	0.01
River- Nelson Downstream	32	1	0.03
River- Nelson Upstream	101	1	0.01
Creeks and Streams	1,547	628	0.41
Total	**11,547**	**1,113**	**0.10**

[1] Figure B4-1 includes a map of sample locations
[2] Figure B4-2 includes a map of sample locations, beaver lodge and muskrat push-ups

Table B4-5: Results of Ground Tracking Surveys by Common Habitats in the Habitat Mapping Area				
Species	**No. of Sign**	**Mean Frequency (sign/100²)**	**Standard Deviation**	**Occurrence by No. of Transects**
Red squirrel	1,865	0.79	1.69	87
Snowshoe hare	1,632	0.67	0.98	102
Moose	1,586	0.61	0.57	116[3]
Caribou	1,390	0.57	1.36	105[4]
Small mammal	375	0.14	0.80	44
Black bear	115	0.06	0.19	55
Red fox	34	0.02	0.17	21
Beaver	22	0.01	0.15	6
River otter	27	0.01	0.07	10
Mink	10	0.01	0.04	7
Pine marten	16	0.01	0.03	13
Fisher	3	0.01	0.07	2
Gray wolf	8	<0.01	0.02	7
Least chipmunk	2	<0.01	0.01	1
Lynx	1	<0.01	<0.01	1
Muskrat	1	<0.01	0.01	1
Raccoon	1	<0.01	0.01	1
Weasel	1	<0.01	0.01	1
Game trails*	156	0.06	0.25	50
Total/Mean	7,075	0.15	0.64	117**

*Game trails where multiple mammal species may be present.

**Not all transects were surveyed each year.

[3] FigureB4-5 includes a map of sample locations and demonstrates the presence/absence of moose

[4] FigureB4-4 includes a map of sample locations and demonstrates the presence/absence of caribou

Table B4-6: Results of Ground Tracking Surveys by Uncommon Habitats in the Habitat Mapping Area				
Species	**No. of Sign**	**Mean Frequency (sign/100²)**	**Standard Deviation**	**Occurrence by No. of Transects**
Red squirrel	120	0.33	0.46	7
Moose	103	0.33	0.34	13
Small mammal	69	0.17	0.44	5
Caribou	46	0.16	0.28	7
Snowshoe hare	34	0.11	0.20	5
Black bear	21	0.06	0.13	5
Beaver	9	0.02	0.08	1
Unknown mammal	7	0.02	0.04	5
Mink	6	0.02	0.05	2
Red fox	1	<0.01	0.01	1
Gray wolf	1	<0.01	0.02	1
Total/Mean	417	1.24	0.96	14

Table B4-7: Mammal Sign Frequency (signs/100m²) by Habitat Type in the Habitat Mapping Area.									
Species	**Black Spruce Pure**	**Jack Pine Mixedwood**	**Young Regen.**	**Black Spruce Mixture**	**Black Spruce Pure, Aspen Mixedwood**	**Black Spruce Pure, Black Spruce Mixture**	**Young Regen. Mixedwood**	**Jack Pine Mixture**	**Total**
Black Bear	0.12	0.10	0.08	0.07	0.10	0.02	0.05	0.16	0.09
Beaver	0	0.05	0.04	0	0	0.04	0.04	0.07	0.03
Caribou	0.28	0.29	0.56	0.02	0.10	0.02	0.19	0.05	0.20
Coyote	0	0	0.02	0	0	0	0	0	0.002
Fisher	0	0.05	0	0	0	0	0	0	0.002
Grey Wolf	0	0.29	0.02	0	0	0.10	0	0.02	0.03
L. Chipmunk	0	0	0	0	0	0.06	0	0	0.01
Mink	0	0	0	0.02	0	0	0	0	0.002
Moose	0.47	0.49	0.88	0.50	0.65	0.43	0.68	0.40	0.56
Pine Marten	0	0	0	0	0	0	0	0.05	0.005
Red Fox	0.03	0	0	0	0	0.08	0.03	0.02	0.02
Red Squirrel	0.94	0	0.04	3.49	2.36	0.86	0.23	0.31	0.92
Snowshoe Hare	1.03	0.15	0.27	1.91	1.76	0.16	0.77	0.28	0.78
Mammal sp.	0	0	0	0.02	0	0	0	0	0.002
Wolverine	0	0	0	0	0	0	0	0.02	0.002
No. Species	**6**	**7**	**8**	**6**	**5**	**9**	**7**	**10**	**15**
Coverage (m²)	**9,611**	**2,057**	**4,781**	**4,408**	**1,988**	**5,145**	**7,797**	**4,253**	**40,039**
Total Sign (m²)	**2.87**	**1.41**	**1.92**	**6.03**	**4.98**	**1.75**	**1.99**	**1.39**	**2.66**

Table B4-8: Results of Small Mammal Trapping in the Habitat Mapping Area (2001-2004)		
Study Area	**Species**	**Total**
Keeyask	arctic shrew	7
	deer mouse	269
	heather vole	876
	least chipmunk	4
	masked shrew	483
	meadow vole	487
	meadow jumping mouse	52
	northern bog lemming	58
	pygmy shrew	4
	red-backed vole	4,230
	red squirrel	1
	shrew spp.	3
	unknown	26
	water shrew	1
Grand Total		**6,501**

Table B4-9: Licensed Moose Harvest Data Returns (1997-2003)	
GHA[5]	**Average Estimated Kill per Year**
1	807
2	661
3	805
3A	693
9	812

Table B4-10: Trapline Returns Reported for Split Lake Resource Management Area (1961-1984)			
Species	**No. Trapped**	**Species**	**No. Trapped**
Arctic Fox	565	Marten	107
Beaver	18,471	Mink	5,765
Black Bear	22	Muskrat	21,787
Coyote	15	Otter	1,640
Ermine	1,877	Raccoon	3
Fisher	620	Red Fox	2,891
Gray Wolf	66	Red Squirrel	1,923
Lynx	1,790	Wolverine	56

[5] Figure B4-6 includes a map of northern Manitoba Game Hunting Areas

Legend

Aerial Survey Blocks

2002 to 2006

Study Areas

Local Study Area

Mapping

Habitat Mapping Area

N

KEEYASK

0 5 10 20 Kilometres

0 2.5 5 10 Miles

Projection: UTM NAD 83, Zone 15
Data Sources: Sample locations- WRCS Ltd.; Study Areas, Nelson River and Highway 280 - ECOSTEM Ltd.
Created by: ECOSTEM Ltd.
Date Created: July 22, 2009

Aerial Survey Blocks for Moose and Caribou

Figure B4-1

Legend

Furbearer Aerial Surveys

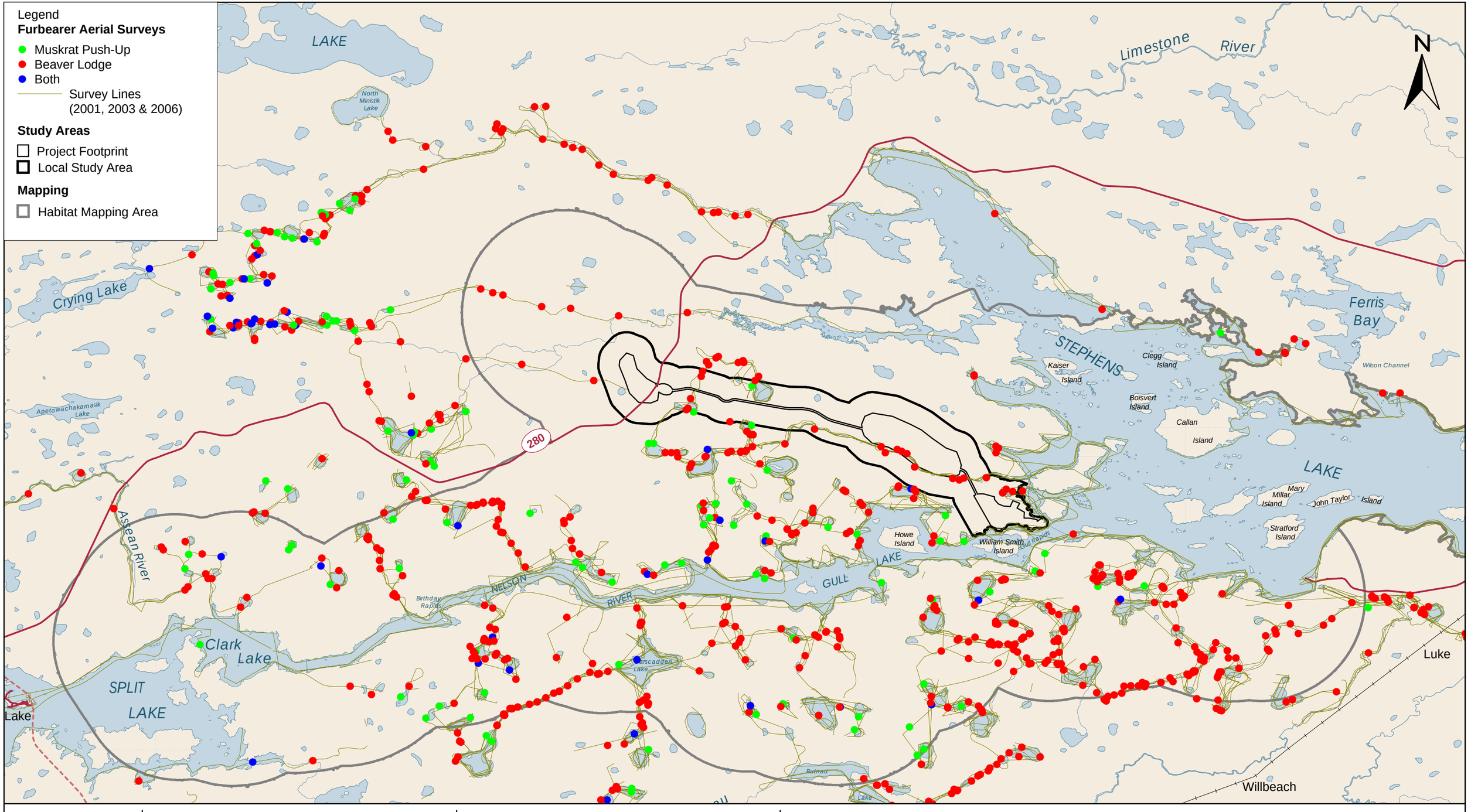
- Muskrat Push-Up
- Beaver Lodge
- Both
- Survey Lines (2001, 2003 & 2006)

Study Areas

- Project Footprint
- Local Study Area

Mapping

- Habitat Mapping Area



KEEYASK

0 2.5 5 10 Kilometres

0 1.5 3 6 Miles

Projection: UTM NAD 83, Zone 15
Data Sources: Sample locations- WRCS Ltd.; Study Areas, Nelson River and Highway 280 - ECOSTEM Ltd.
Created by: ECOSTEM Ltd.
Date Created: July 15, 2009

Aquatic Furbearer Aerial Surveys Including Beaver Lodge and Muskrat Push-Up Locations

Figure B4-2

Legend

Study Areas

- Project Footprint
- Local Study Area

Mapping

- Habitat Mapping Area

Mammal Thread Transect Locations

- 2001 to 2005

LAKE
North Ministik Lake
Limestone River
N
Crying Lake
Apetowachakamasik Lake
280
Astean River
Ferris Bay
STEPHENS
Clegg Island
Kaiser Island
Wilson Channel
Boisvert Island
Callan Island
LAKE
Mary Millar Island
John Taylor Island
Stratford Island
Howe Island
William Smith Island
Gull Rapids
GULL LAKE
NELSON RIVER
Birthday Rapids
Clark Lake
Carscadden Lake
SPLIT LAKE
Lake
Butnau Lake
Luke
Willbeach

KEEYASK

0 2.5 5 10 Kilometres
0 1.5 3 6 Miles

Projection: UTM NAD 83, Zone 15
Data Sources: Sample locations- WRCS Ltd.; Study Areas, Nelson River and Highway 280 - ECOSTEM Ltd.
Created by: ECOSTEM Ltd.
Date Created: July 15, 2009

Ground Tracking Sign Survey Locations in the Local Study Area and Habitat Mapping Area

Figure B4-3

Legend

Study Areas

- Project Footprint
- Local Study Area

Habitat Mapping Area

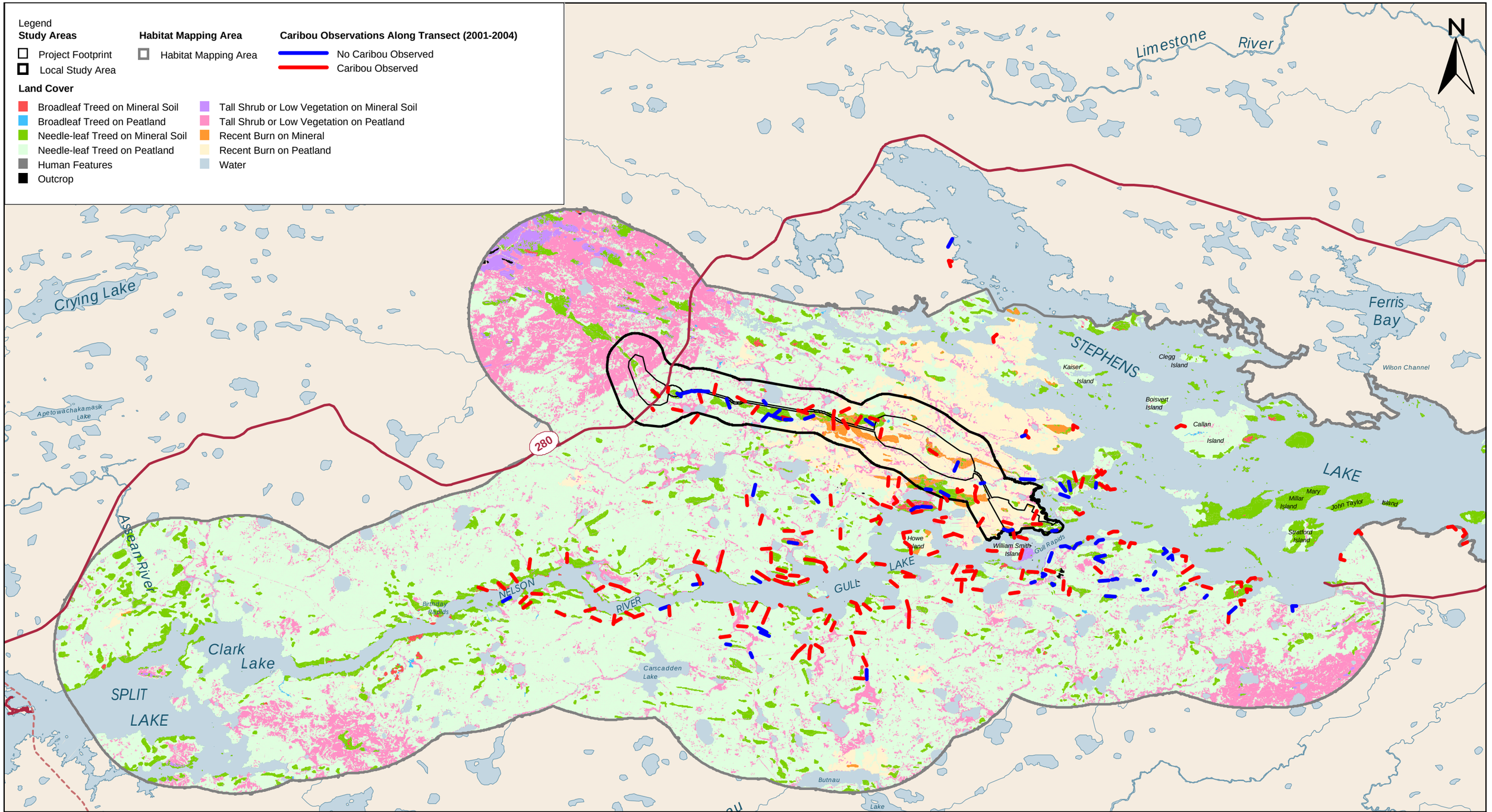
- Habitat Mapping Area

Caribou Observations Along Transect (2001-2004)

- No Caribou Observed
- Caribou Observed

Land Cover

- Broadleaf Treed on Mineral Soil
- Broadleaf Treed on Peatland
- Needle-leaf Treed on Mineral Soil
- Needle-leaf Treed on Peatland
- Human Features
- Outcrop
- Tall Shrub or Low Vegetation on Mineral Soil
- Tall Shrub or Low Vegetation on Peatland
- Recent Burn on Mineral
- Recent Burn on Peatland
- Water



KEEYASK

0 2.5 5 10 Kilometres
0 1.5 3 6 Miles

Projection: UTM NAD 83, Zone 15
Data Sources: Transect data - WRCS; Study Areas, Land Cover, Nelson River and Highway 280 - ECOSTEM Ltd.; Impact areas- MB Hydro.
Created by: ECOSTEM Ltd.
Date Created: July 14, 2009

Summer Caribou Observations (2001-2004) Along Transects Shown on Land Cover in the Habitat Mapping Area

Figure B4-4

Legend

Study Areas

- Project Footprint
- Local Study Area

Mapping

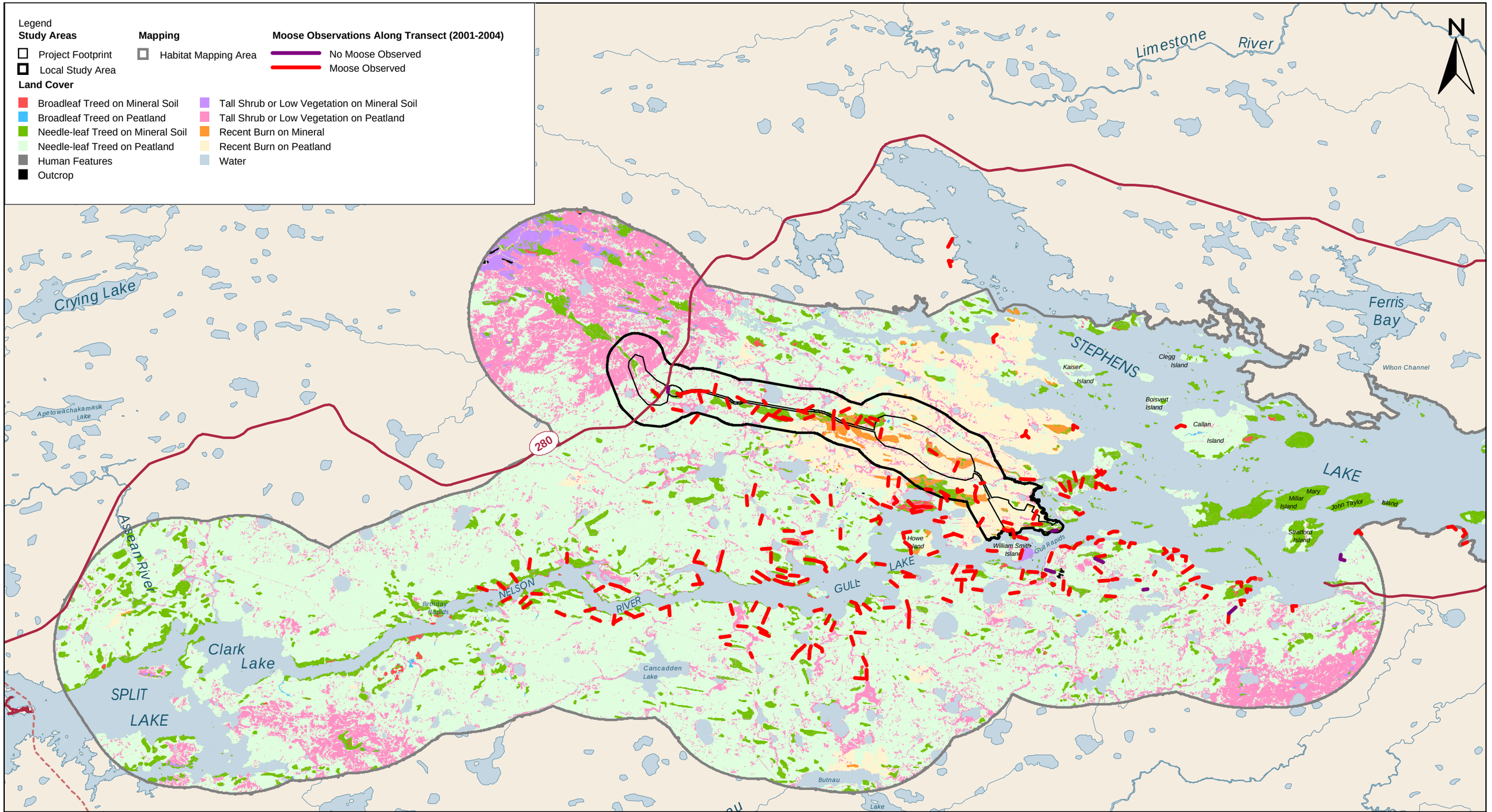
- Habitat Mapping Area

Moose Observations Along Transect (2001-2004)

- No Moose Observed
- Moose Observed

Land Cover

- Broadleaf Treed on Mineral Soil
- Broadleaf Treed on Peatland
- Needle-leaf Treed on Mineral Soil
- Needle-leaf Treed on Peatland
- Human Features
- Outcrop
- Tall Shrub or Low Vegetation on Mineral Soil
- Tall Shrub or Low Vegetation on Peatland
- Recent Burn on Mineral
- Recent Burn on Peatland
- Water



KEEYASK

0 2.5 5 10 Kilometres
0 1.5 3 6 Miles

Projection: UTM NAD 83, Zone 15
Data Sources: Transect data - WRCS; Study Areas, Land Cover, Nelson River and Highway 280 - ECOSTEM Ltd.; Impact areas- MB Hydro.
Created by: ECOSTEM Ltd.
Date Created: July 14, 2009

Summer Moose Observations (2001-2004) Along Transects Shown on Land Cover in the Habitat Mapping Area

Figure B4-5

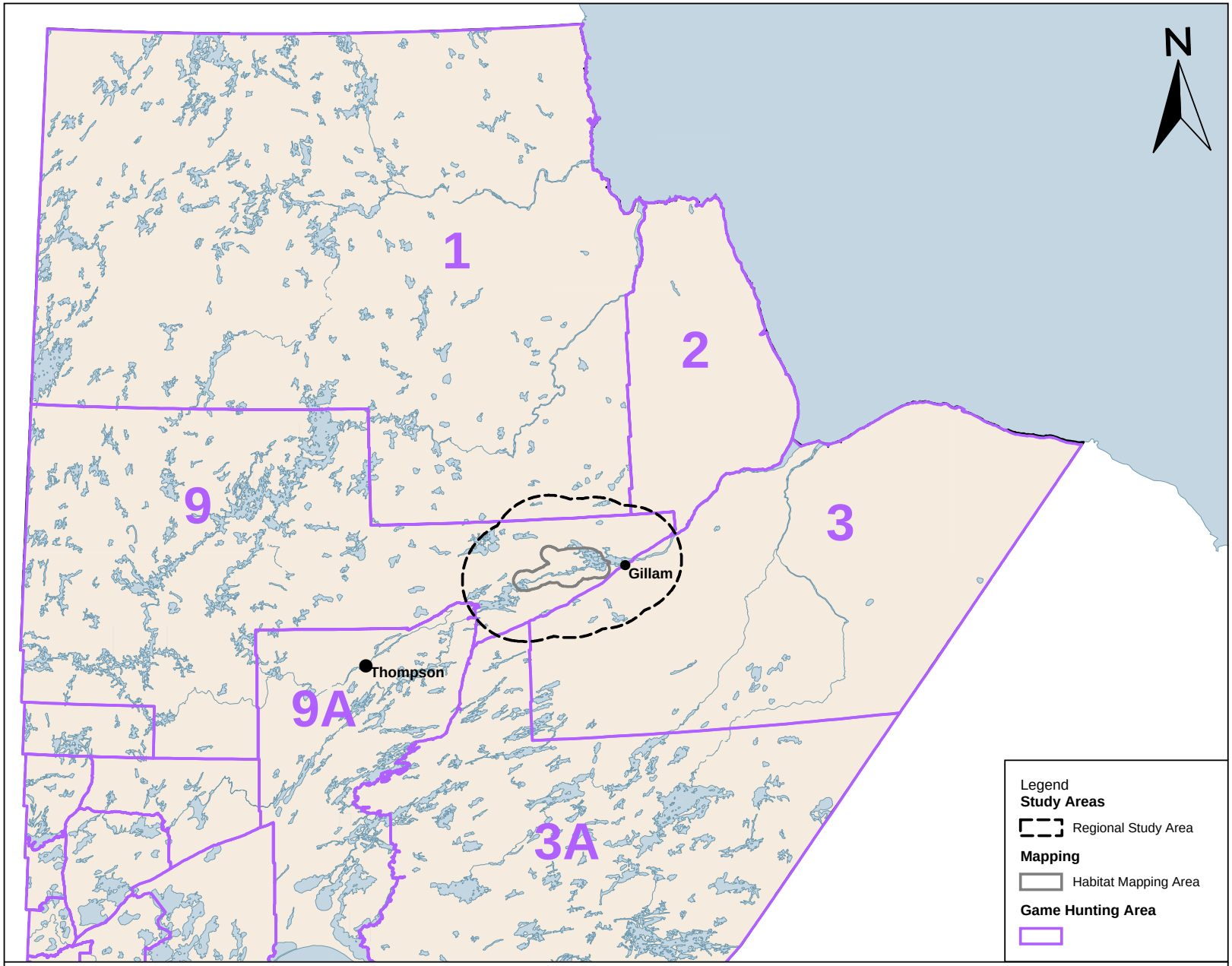

N
1
2
3
9
9A
3A
Gillam
Thompson
Legend
Study Areas
Regional Study Area
Mapping
Habitat Mapping Area
Game Hunting Area
KEEYASK
0 12.5 25 50 100 Kilometres
0 12.5 25 50 Miles
Projection: UTM NAD 83, Zone 14
Data Sources: Game hunting areas, water - Manitoba Conservation; Study areas - ECOSTEM Ltd.
Created By: ECOSTEM Ltd.
Date Created: July 14, 2009
Game Hunting Areas in Northern Manitoba

Figure B4-6

Appendix B5

Socio-economic Information

Table B5-1: Local Region Communities Covered by Statistics Canada Data	
First Nation	**Community in Local Region to which Statistics Canada Data Applies**
Tataskweyak	Split Lake
War Lake	Ilford
York Factory	York Landing
Fox Lake	Bird

Table B5-2: Population Distribution for Gillam and Thompson 2001 and 2006 [2]				
Age Group	**Gillam 2001**	**Gillam 2006**	**Thompson 2001**	**Thompson 2006**
Total[1]	1,175	1,210	13,255	13,445
0 - 4	110	105	1240	1,140
5 - 9	150	115	1255	1,210
10 -14	95	125	1235	1,250
15 - 19	85	75	1120	1,170
20 - 24	60	105	890	995
25 - 29	75	85	940	1,020
30 - 34	100	105	1165	1,050
35 - 39	160	105	1230	1,095
40 - 44	90	125	1065	1,190
45 - 49	95	75	975	1,000
50 - 54	75	95	940	855
55 - 59	45	50	555	640
60 - 64	10	25	325	400
65 - 69	10	15	160	210
70 - 74	5	10	70	110
75 +	10	0	85	95
% of Population over the age of 15	69.8%	71.9%	71.8%	73.1%
Source: Statistics Canada (2002, 2007)				
Notes: 1. Population totals and individual cells are rounded to ensure confidentiality. 2. 2001 and 2006 population data – 100%				

Table B5-3: Population Distribution for KCN Communities (Tataskweyak Cree Nation at Split Lake, War Lake First Nation at Ilford, York Factory First Nation at York Landing, And Fox Lake Cree Nation at Fox Lake 2 (Bird)) 2001 and 2006[1,2]								
Age Group	**Split Lake 2001**	**Split Lake 2006**	**Ilford 2001**	**Ilford 2006**	**York Landing 2001**	**York Landing 2006**	**Fox Lake 2 (Bird) 2001**	**Fox Lake 2 (Bird) 2006**
Total[3]	1,581	1,819	143	116	420	415	145	105
0 - 4	185	240	15	10	50	50	15	5
5 - 9	210	210	20	10	60	50	25	5
10 -14	200	230	15	15	55	50	10	15
15 - 19	150	195	0	5	25	40	15	5
20 - 24	135	135	15	0	40	30	5	10
25 - 29	120	140	15	15	45	25	10	5
30 - 34	145	115	10	10	30	40	10	10
35 - 39	100	135	5	5	30	20	5	5
40 - 44	90	100	15	10	25	30	15	10
45 - 49	60	95	10	10	15	30	10	15
50 - 54	55	70	10	10	25	15	0	5
55 - 59	35	50	0	5	10	10	10	0
60 - 64	35	40	5	0	10	5	5	0
65 - 69	45	45	5	5	0	5	10	10
70 - 74	25	20	0	0	0	0	0	0
75 +	25	20	0	0	10	10	5	0
% of Population over the age of 15	64.5%	63.8%	62.9%	64.7%	63.1%	62.7%	69.0%	71.4%

Source: Statistics Canada (2002, 2007)

Notes:

1. Statistics Canada refers to the Indian Reserves of Tataskweyak Cree Nation, War Lake First Nation, York Factory First Nation, and Fox Lake Cree Nation respectively as Split Lake, Ilford, York Landing and Fox Lake 2 (Bird).
2. 2001 and 2006 population data – 100%
3. Population totals and individual cells are rounded to ensure confidentiality.

Table B5-4: Population Distribution For Northern Manitoba and Manitoba 2001 and 2006 [1]				
Age Group	**Northern Manitoba[2] 2001**	**Northern Manitoba 2006**	**Manitoba 2001**	**Manitoba 2006**
Total[3]	82,435	84,600	1,119,580	1,148,400
0 - 4	8,795	8,615	70,675	68,100
5 - 9	9,375	8,830	80,345	73,840
10 -14	8,810	9,150	82,695	83,235
15 - 19	7,430	8,065	80,420	83,825
20 - 24	5,655	6,070	72,850	77,750
25 - 29	5,955	5,505	70,400	70,250
30 - 34	6,070	5,650	72,775	70,725
35 - 39	6,230	5,735	87,405	73,660
40 - 44	5,725	5,915	89,725	88,080
45 - 49	4,825	5,470	82,340	89,730
50 - 54	4,250	4,615	73,370	81,845
55 - 59	2,915	3,700	55,420	71,730
60 - 64	2,160	2,505	44,740	53,755
65 - 69	1,535	1,855	40,750	78,930
70 - 74	1,040	1,200	37,815	36,815
75 +	1,675	1,695	77,855	82,965
% of Population over the age of 15	67.3%	68.6%	79.1%	83.6%
Source: Statistics Canada (2002, 2007)				
Notes: 1. 2001 and 2006 population data – 100% 2. Northern Manitoba region defined by Statistics Canada as census divisions 19, 21, 22 and 23. 3. Population totals and individual cells are rounded to ensure confidentiality.				

Appendix B5-2

Manitoba Hydro
Camp Regulations
Keeyask Infrastructure Project

The Keeyask Infrastructure Project camp practices and enforces a Zero Tolerance Policy in all areas of the facility. This includes, but is not limited, to verbal/physical abuse, sexual harassment and vandalism and illegal Drugs. Smoking is permitted in designated areas only. Smoking in any non-smoking area is subject to a $500 fine and/or loss of accommodation privileges.

1. A person who has been assigned a room in Camp may not change rooms without the consent of the Camp Administrator (or Delegate).

2. Janitorial Service is provided and includes the making of beds, changing of linen, cleaning floors. The occupants of a room are responsible for tidiness of that room. Janitorial Services do not include picking up items from floor i.e. laundry, boots, etc.

3. Persons who have been assigned to a room are liable for all damage to that room, and all costs incurred in repairing such damage will be charged to the occupant(s).

4. Electric heating appliances of any kind (for example, hotplates, irons, toasters, kettles, heaters, etc.) other than those provided by the camp owner, are not to be used in the rooms.

5. All persons shall take reasonable precautions to avoid causing a nuisance or disturbance to other persons in the Camp. Quiet time is from 11:00 PM to 07:00 AM. Fighting is strictly prohibited.

6. No person shall engage in any activity which is in violation of *The Liquor Control Act* or *The Controlled Drugs and Substances Act* (or successor legislation) while within the camp area.

7. No person shall engage in any gambling activity which is in violation of the gambling laws of the Province of Manitoba while within the camp area.

8. There shall be no tampering with fire protection and prevention equipment. Any person who is found tampering with such equipment will be prosecuted.

9. Smoking is strictly prohibited at any Manitoba Hydro site except in designated areas. No smoking is permitted within 10 meters of any building entrance. Smoking is not permitted in dorm rooms or any other buildings. Any person who causes a fire of any sort in any of the facilities at site will be liable for all resulting damages. Caution is to be exercised with cigarettes, cigars, etc. near the camp buildings and forested areas. All cigar and cigarette butts are to be discarded in approved disposal containers.

10. Except as may be specifically otherwise provided, Manitoba Hydro will not be liable for loss or damage to personal belongings of persons occupying rooms within the Camp, whether the loss or damage is due to fire, theft, negligence or any other cause.

11. Accidents and sickness must be immediately reported to the worker's employer.

12. Defective camp equipment must be reported to the Camp Office as soon as it is noticed. Defective camp equipment must not be repaired or tampered with by unauthorized persons.

13. Firearms are strictly prohibited in the Camp and Project site area.

14. All persons are required to register at the Camp Office on arrival at the camp and on departure from the camp. Providing that this check-out procedure is followed, rooms will normally be held for the length of the approved leave. No unregistered guests allowed in the rooms.

15. All persons leaving the camp must report to the Security Office. In the interest of safety, persons leaving for recreational purposes are encouraged to report their plans to the Security Office.

16. Identification cards are issued upon arrival, and remain the property of Manitoba Hydro. Identification cards are to be available at all times. The Security Patrol is authorized to request identification of all persons. Manitoba Hydro may require the return of identity cards at any time, to modify or cancel them. Individuals are responsible for their identity cards and will be charged for the replacement cost ($15.00) if a card is lost or not returned when they check out of camp. Exchanging keys or rooms without permission is not permitted. Allowing/Swiping unauthorized guests into any areas, such as Gym, Lounges and Dining Rooms will result in loss of site privileges.

17. All persons must display their identification at meals. Meals will be served at specified hours in the designated dining area. All dishes, trays, etc. must be returned to the designated area.

18. Pets are not permitted in any of the camp buildings or in the camp area. The feeding of any animals in the camp area is prohibited and is a chargeable offence by Manitoba Conservation under *The Wildlife Act*.

19. Women are not allowed to enter the men's bunkhouses, and men are not allowed to enter the women's bunkhouse unless married accommodations are provided.

20. Any person finding an object that may be of archaeological significance shall leave it in place and report it to the Manitoba Hydro Camp office immediately.

21. No person shall urinate or defecate in any area of the Camp other than in the appropriate locations in the washrooms. All persons shall leave the washrooms in a reasonable state of cleanliness after use.

22. No person shall litter or commit acts of vandalism in any area of the Camp.

23. It is expressly agreed and understood that the use and occupation of the Camp facilities is not intended to create, as between Manitoba Hydro and those persons occupying rooms in the camp, the relationship of landlord and tenant within the meaning of *The Landlord and Tenant Act*, Chapter L70 in the continuing Consolidated Statues of Manitoba, and that the

right to remain in the camp may be revoked by Manitoba Hydro at any time and without notice.

24. All camp issued items must be returned upon check-out.

25. Personal vehicles are to be parked in designated areas only and are not to be used for transportation to the worksite unless written permission is obtained from the resident Site Manager (or his designate), and in that event, drivers must comply with all worksite regulations.

26. Hats or head wear, dirty boots, gym clothing and work clothing, including coveralls and Personal Protective Equipment (PPE) are not allowed in the dining or sandwich rooms.

27. Parking is permitted in designated areas only. Any vehicles parked improperly or unregistered may be towed or disposed of at the guest's expense. Vehicles parked improperly will receive and $80 fine.

Manitoba Hydro corporate policy G598 & D595

VIOLATIONS OF ANY OF THESE REGULATIONS MAY RESULT IN IMMEDIATE EVICTION FROM THE CAMP.

MAJOR OFFENCE: Any incident which involves the following:

a) Fire or misuse of fire fighting equipment, or tampering with fire protection and/or fire prevention equipment;
b) Vandalism, possession of a firearm, or smoking in bed;
c) Bodily assault on a member of the security police, caterers or Corporation personnel involved in camp operations;
d) Circumstances that, in the judgment of the Camp Administrator with the concurrence of the Camp Eviction Committee, constitute a major offence;
e) Third minor offence.

MINOR OFFENCE: Any incident which violates the posted Camp rules and is not a major offence.

I have received a copy of the above Camp Regulations.

I have read them or have had them read to me, I understand them and agree to abide by the rules.

Print Name: _____

_____ _____

Signature of Employee Date Signed

Witnessed By:_____

Camp Office Attendant

The Camp Manager may withdraw your camp accommodation and privileges if you violate posted camp rules and regulations (C.O.P.P. 11.08).

- If you commit a major offence (D595), you are evicted from camp and are denied camp accommodation and privileges at all Manitoba Hydro camps for a period of one year or longer.
- If you commit a minor offence (D595), you may be evicted from camp and may be denied camp accommodation and privileges at that camp for a period of 3 months.
-

1. Disciplinary Action

In addition to camp eviction, Manitoba Hydro has the right to impose other disciplinary action such as suspension or dismissal as outlined in Discipline (G594).

2. Camp Reinstatement

Your Camp accommodation and privileges are reinstated automatically when the eviction period expires.

The Camp Administrator may deny your reinstatement because of your repeated offences.

CAMP RULES

1. Firearms & Offensive Weapons

Firearms or offensive weapons are prohibited in the Camp or Project worksite area (Camp Regulation No. 13). These items must remain at the Security Office outside of the Project area. These items are identified, tagged and locked in a cabinet by Security until the resident chooses to use them outside the area. The owner is given a portion of the claim tag to allow them to claim their property at a later date. When the owner claims his/her property, both sections of the claim tag are destroyed and the transaction is recorded in Security's register.

2. Recreational Vehicles

Personal recreational vehicles (i.e., snowmobiles, ATVs, boats) are not permitted at the worksite.

3. Alcohol

No alcohol will be permitted to be in possession or consumed by any residents in the Camp dormitories. .

4. Loss of accommodation keys

Each resident will leave a $5.00 deposit when registering in Camp; in the event the key is lost the subsequent deposit will be $25.00 for the second loss and $50.00 for the third. Loss of keys represents a security concern and the costs associated with re-cores will be covered by this increase in deposits.

5. No Visitors

Non-employees are not permitted to visit the Camp or Construction site.

Note: Infractions of any of the Camp Regulations or these rules may result in disciplinary action being taken, which could include a warning letter, eviction from camp, assessment for damages, and/or criminal prosecution.

Appendix B6

Heritage Resources Information

METHODS OF SURVEY

The investigation of the access road, adjacent borrows locations and portions of the proposed Project Footprint consisted of aerial and pedestrian surveys conducted between 2002 and 2005. A total of 66 shovel tests were carried out (Table 3.6-1); of these 5 were positive for artifacts. These positive tests were located on the north bank of the Nelson River at Keeyask Rapids.

Table B6-1: Shovel Tests Completed for the Keeyask Infrastructure Project

	Date	Region	Result	UTMX	UTMY
1	July 30/05	N. Access Road	Negative	358948	6250424
2	July 30/05	N. Access Road	Negative	358949	6250376
3	July 30/05	N. Access Road	Negative	358943	6250384
4	July 30/05	N. Access Road	Negative	358928	6250437
5	July 30/05	N. Access Road	Negative	358924	6250489
6	July 30/05	N. Access Road	Negative	358921	6250936
7	July 30/05	N. Access Road	Negative	358892	6250568
8	July 31/05	N. Access Road	Negative	350656	6253413
9	July 31/05	N. Access Road	Negative	350782	6253397
10	July 31/05	N. Access Road	Negative	350870	6253422
11	July 31/05	N. Access Road	Negative	351019	6253393
12	July 31/05	N. Access Road	Negative	351201	6253401
13	July 31/05	N. Access Road	Negative	351416	6253398
14	July 31/05	N. Access Road	Negative	351535	6253390
15	July 31/05	N. Access Road	Negative	349015	6253720
16	July 31/05	N. Access Road	Negative	348862	6253803
17	July 31/05	N. Access Road	Negative	348712	6253894
18	July 31/05	N. Access Road	Negative	348558	6253958
19	July 31/05	N. Access Road	Negative	348391	6254063
20	July 31/05	N. Access Road	Negative	348081	6254247
21	July 31/05	N. Access Road	Negative	347885	6254405
22	July 31/05	N. Access Road	Negative	347776	6254442
23	July 31/05	N. Access Road	Negative	346765	6254332

Table B6-1: Shovel Tests Completed for the Keeyask Infrastructure Project					
	Date	**Region**	**Result**	**UTMX**	**UTMY**
24	July 31/05	N. Access Road	Negative	346458	6254356
25	July 31/05	N Access Road	Negative	346322	6254452
26	July 31/05	N Access Road	Negative	346184	6254583
27	Aug 1/05	N Access Road	Negative	343988	6254620
28	Aug 1/05	N Access Road	Negative	344177	6254598
29	Aug 1/05	N Access Road	Negative	344337	6254543
30	Aug 1/05	N Access Road	Negative	344435	6254473
31	Aug 1/05	N Access Road	Negative	344502	6254403
32	Aug 1/05	N Access Road	Negative	338864	6258456
33	Aug 1/05	N Access Road	Negative	338974	6258350
34	Aug 1/05	N Access Road	Negative	340580	6257491
35	Aug 1/05	N Access Road	Negative	340786	6257332
36	Aug 1/05	N Access Road	Negative	340931	6257166
37	Aug 1/05	N Access Road	Negative	342876	6254925
38	Aug 1/05	N Access Road	Negative	342735	6254957
39	Aug 1/05	N Access Road	Negative	342554	6255005
40	Aug 1/05	N Access Road	Negative	342436	6255112
41	July 23/04	Gull Lake	Negative	356938	6248315
42	July 23/04	Gull Lake	Positive	356938	6248315
43	July 23/04	Gull Lake	Negative	356938	6248315
44	July 23/04	Gull Lake	Negative	356938	6248315
45	May 29/03	Gull Camp	Negative	363924	6246982
46	May 29/03	Gull Camp	Negative	363926	6246970
47	May 29/03	Gull Camp	Negative	363914	6246964
48	May 29/03	Gull Camp	Negative	363908	6246975
48	May 29/03	Gull Camp	Negative	363886	6247074
50	May 29/03	Gull Camp	Negative	363868	6247066
51	May 29/03	Gull Camp	Negative	363849	6247013

Table B6-1: Shovel Tests Completed for the Keeyask Infrastructure Project					
	Date	**Region**	**Result**	**UTMX**	**UTMY**
52	May 29/03	Gull Camp	Negative	363942	6246966
53	May 29/03	Gull Camp	Negative	363950	6246978
54	May 29/03	Gull Camp	Negative	363892	6246958
55	May 29/03	Gull Camp	Negative	363874	6246987
56	May 29/03	Gull Camp	Negative	363876	6247077
57	May 29/03	Gull Camp	Negative	363865	6247067
58	July 16/03	Borrow/Access Road	Negative	352773	6253162
59	July 16/03	Borrow/Access Road	Negative	352782	6253201
60	July 16/03	Borrow/Access Road	Negative	352950	6253164
61	July 16/03	Borrow/Access Road	Negative	352969	6253165
62	July 16/03	Borrow/Access Road	Negative	353027	6253082
63	July 16/03	Borrow/Access Road	Negative	352989	6253143
64	July 16/03	Borrow/Access Road	Negative	353010	6253120
65	July 16/03	Borrow/Access Road	Negative	352032	6253273
66	July 16/03	Borrow/Access Road	Negative	352080	6253276
67	July 16/03	Borrow/Access Road	Negative	351927	6253398
68	July 16/03	Borrow/Access Road	Negative	352025	6253287
69	July 17/03	Borrow/Access Road	Negative	352107	6253273
70	July 16/03	Borrow/Access Road	Negative	358846	6250652
71	July 16/03	Borrow/Access Road	Negative	359049	6250731
72	July 16/03	Borrow/Access Road	Negative	358964	6251263
73	July 16/03	Borrow/Access Road	Negative	358910	6250813
74	July 16/03	Borrow/Access Road	Negative	358939	6251181
75	July 16/03	Borrow/Access Road	Negative	361940	6250641
76	July 16/03	Borrow/Access Road	Negative	361991	6250588
77	July 16/03	Borrow/Access Road	Negative	361922	6250684
78	July 17/03	Borrow/Access Road	Negative	361761	6250674
79	Aug 22/02	North Bank River	Negative	363445	6247380

Table B6-1: Shovel Tests Completed for the Keeyask Infrastructure Project					
	Date	**Region**	**Result**	**UTMX**	**UTMY**
80	Aug 22/02	North Bank River	Negative	363443	6247370
81	Aug 22/02	North Bank River	Negative	363966	6247224
82	Aug 22/02	Below Keeyask	Negative	365071	6247795
83	Aug 23/02	North Bank River	Positive	366518	6247026
84	Aug 23/02	North Bank River	Positive	366515	6247021
85	Aug 23/02	North Bank River	Positive	366518	6247021
86	Aug 23/02	North Bank River	Positive	366518	6247020
87	Aug 24/02	North Bank River	Negative	369103	6247745

Table B6-2. Cultural Chronology Based on Select Technology.		
Archaeological Period	*Technology*	
	Container Type	*Food Procurement*
Late Historic Period "Nationhood" (*ca.* 130 – 70 B.P.)	Porcelain Tableware Earthenware Dinnerware Stoneware Storage Jars Tin Cans	Repeating Rifles Automatic Shotguns
Middle Historic Period "Formative Stage II" (*ca.* 179 – 130 B.P.)	Earthenware Dinnerware Stoneware Storage Jars Copper Pots/Kettles	Breach Loading Rifles/ Shotguns Percussion Cap Muskets
Early Historic Period "Formative Stage I" (*ca.* 360 – 179 B.P.)	Copper Pots/Kettles	Flintlock Muskets/Shotguns Projectile Points • Metal • Side-notched • Late Taltheilei
Late Pre-Contact Period "Initial and Terminal Woodland Cultures" (*ca.* 2200 - 360 B.P.)	Clay Vessels: • Selkirk (Late Woodland) • Clearwater Lake Punctate • Duck Bay Punctate • Blackduck (Middle Woodland) • Laurel (Early Woodland)	Bow & Arrow Bone harpoons Nets Projectile Points • Side-notched • Eastern and Plains Triangular • Avonlea • Besant/Sonota • Middle Taltheilei
Middle Precontact Period "Archaic Cultures" (*ca.* 6500 - 2200 B.P.)	Fiber Baskets/Bags Animal Viscera/Hide	Atlatl Bone harpoons Nets? Projectile Points • Larter Tanged - Pelican Lake • Duncan/Hanna/McKean • Old Copper • Raddatz • Oxbow • Early Taltheilei
Early Precontact Period "Palaeo Cultures" (*ca.* 12000 – 6500 B.P.)	Fiber Baskets/Bags Animal Viscera/Hide	Spear Bone harpoons? Projectile Points • Agate Basin • Plano