



**ENVIRONMENTAL BASELINE REPORT
MARTISON PHOSPHATE PROJECT MINE
EXPLORATION SITE**

PHOSCAN CHEMICAL CORP.

Submitted to:

**PhosCan Chemical Corp.
2 Bloor Street West, Suite 1730
Toronto, Ontario, M4W 3E2**

Submitted by:

**AMEC Earth & Environmental
a Division of AMEC Americas Limited
160 Traders Blvd. E., Suite 110
Mississauga, Ontario, L4Z 3K7**

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1.0 INTRODUCTION

This Environmental Baseline Report for the Martison Phosphate Project mine exploration site was prepared for PhosCan Chemical Corporation. The location of the mine exploration site in relation to the local communities and Highway 11 is shown in Figure 1-1. Data from the baseline study conducted during 2007 at the exploration site (Golder 2008) have also been incorporated into this document where appropriate, such as the characterization of Station C6 and East and West Lakes, to increase the interpretive value of the recent works.

1.1 Project Overview and Background

PhosCan has been carrying out mineral exploration at the Martison site since 1999 with the intent of developing a phosphate producing open pit mine. The Project site is located approximately 70 km north/northeast of Hearst, and is currently accessible by a 51 km stretch of the Fushimi all-season road, linked to a 39 km stretch of the Martison Project winter road, or by helicopter (Figure 1-1). The mine exploration site, itself, is characterized by a combination of muskeg (wetland shrub) and mainly black spruce forest (dense coniferous forest), developed on wet, organic terrain.

Area watersheds adjacent to and in the general vicinity of the proposed mine site are shown in Figure 1-2. The Active Mining Claims, Disposition Lands and Alienation Lands for the project site and the general region are indicated in Figure 1-3.

1.2 Regional Setting

The mine exploration site is just north of the transition from the more heavily (closed canopy) forested areas of the boreal zone, to the more open environment of the southern fringe of the James Bay Lowlands. The more open muskeg and patchy forest terrain of the Lowlands, is readily apparent in the distribution of plant community types where an abrupt increase in the expression of wetland-treed and wetland-shrub vegetation (treed and open muskeg environments) occurs in the vicinity of the Project site

Terrain conditions associated with this forest-Lowlands transition zone are relatively subdued, and particularly in the area north from the Fox River. North of the Fox River, the landscape shows extensive evidence of glacial fluting (parallel shallow ridges and grooves), with a well defined northeast - southwest orientation corresponding to the direction of glacial advance. The ridges in some cases can be several kilometres in length, and from 10's to 100's of metres in width. The ridges are better drained than the surrounding landscape and support well developed coniferous and mixed forest communities. The intervening troughs are poorly drained and support lowland black spruce and muskeg environments.

In terms of wildlife, the region supports a diverse assemblage of mammals and birds, with a modest representation of amphibians, and only one reptile species. Of primary interest in terms of mammals are the ungulate species (moose, woodland caribou, and to a lesser extent deer), large predators (wolves and black bear), and furbearer species. Numerous bird species also nest in the area

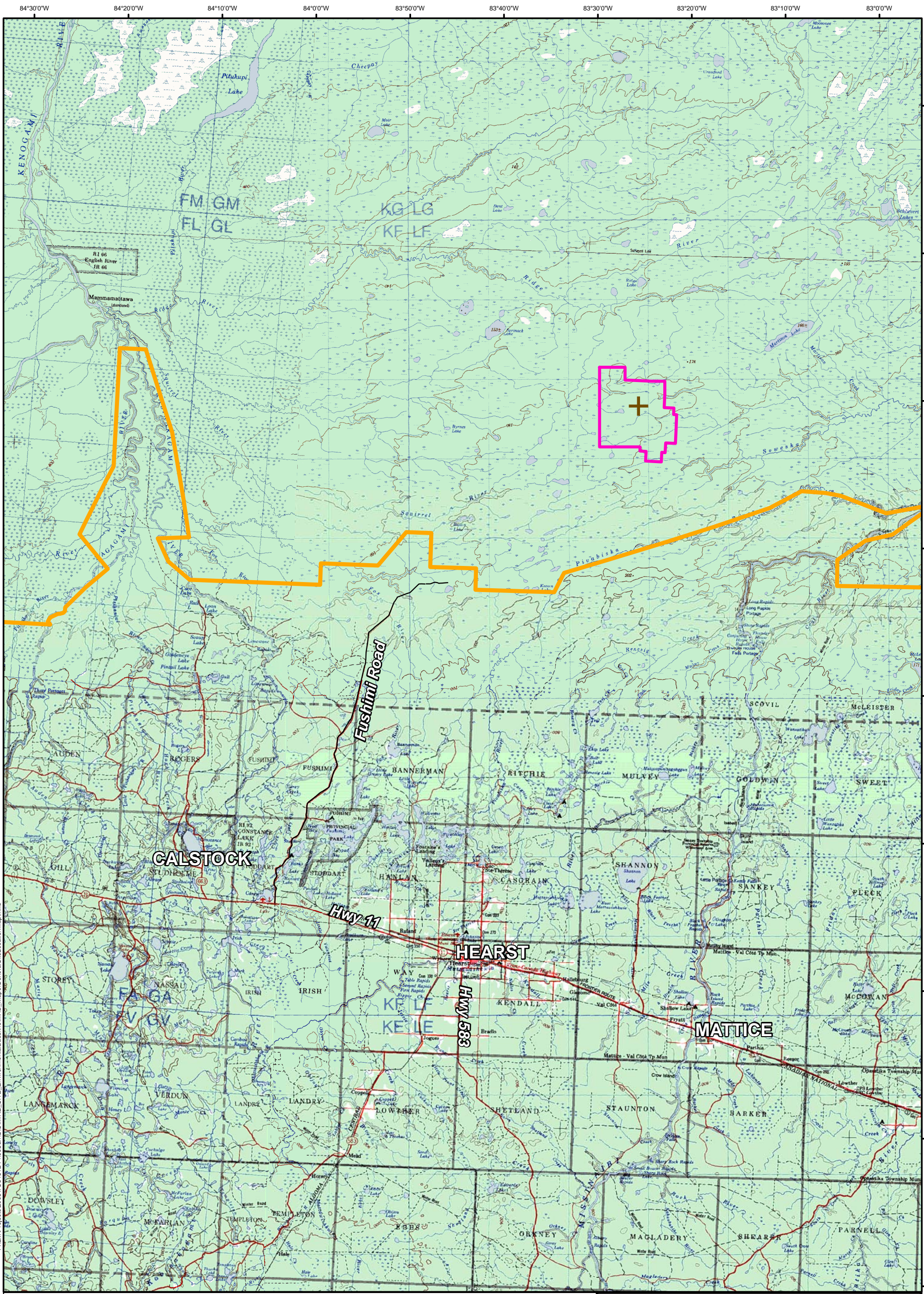
including several species of raptors (hawks and owls), waterfowl, shorebirds, woodpeckers, and perching birds (songbirds). Six species of frogs, one snake species, and possibly one or two species of salamanders potentially occur in the area. Of the wildlife species present, the most notable species is the woodland caribou, which is currently considered a Species at Risk – Threatened Category.

Aquatic environments are provided by numerous lakes, rivers, creeks and ponds. Several larger lakes occur in the vicinity of Fushimi Road and Highway 11, including Fushimi Lake, Carey Lake, Banks Lake, St. Joseph Lake, Fox Lake and Bannerman Lake. Further north in the general vicinity of the proposed open pit, the majority of lakes are comparatively small (less than 2 km in length and 1 km in width). Two large, north-flowing rivers occur in the region – the Kabinakagami River well to the west of the Fushimi Road and the Missinaibi River immediately to the southwest of the mine exploration site. Smaller rivers in the region include the Ridge, Pivabiska, Soveska, Squirrel and the Fox Rivers (Figure 1-2). Numerous other, mostly unnamed small creeks also occur throughout the area. The majority of the creek systems in the area support coolwater fish communities.

From a socio-economic perspective, Hearst is the principal local community. Hearst has a population of 5,825 (2001 census) and has an economy that is heavily dependent on the forest industry and government services. A number of smaller hamlets also occur in the immediate Hearst area. The top three Hearst area forest sector employers are Columbia Forest Products (Levesque Division), Tembec (Malette United Division), and Lecours Lumber Co. Ltd. The Hearst area is serviced by Highway 11 (the Trans-Canada Highway), and by the Canadian National and Algoma Central Railways. The Fushimi Road and many other area roads were developed to provide access to forestry resources.

The Constance Lake First Nation (CLFN) community is located on IR 92, on the Kabinakagami River system, approximately 32 km west of Hearst, 6 km west of the Fushimi Road, and 8 km north of Highway 11. Constance Lake has an on-reserve population of approximately 743 residents (INAC 2008). The community became established in the area during the early 1940's with the first Cree inhabitants migrating to the area from further north, attracted by the railway and local forestry mills. Most came from English River Reserve No. 66, which is located on the east bank of the Kenogami River. The largest employers for the CLFN are those that provide health, education and other community services to the community, and local forestry operations.

Two provincial parks are within the general area and include Fushimi Provincial Park located southwest of the mine exploration site and the Missinaibi [River] Provincial Park located approximately 15 km southeast of the site. A number of recreational properties are associated with the larger lakes near the southern end of the Fushimi Road. Various recreational activities typical of northern Ontario community areas occur in the region such as hunting, fishing, boating, trapping, snowmobiling, and other such activities. Activities near the planned open pit are more limited due to poor access and less hospitable terrain.



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LEGEND

- Far North Planning Area South Boundary
- Fushimi Road
- PhosCan Claim Boundary
- Proposed Pit



MARTISON PHOSPHATE PROJECT

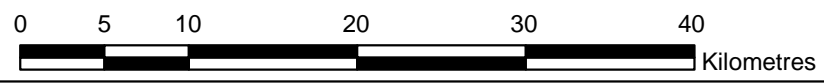
General Site Location Map

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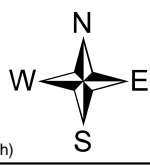
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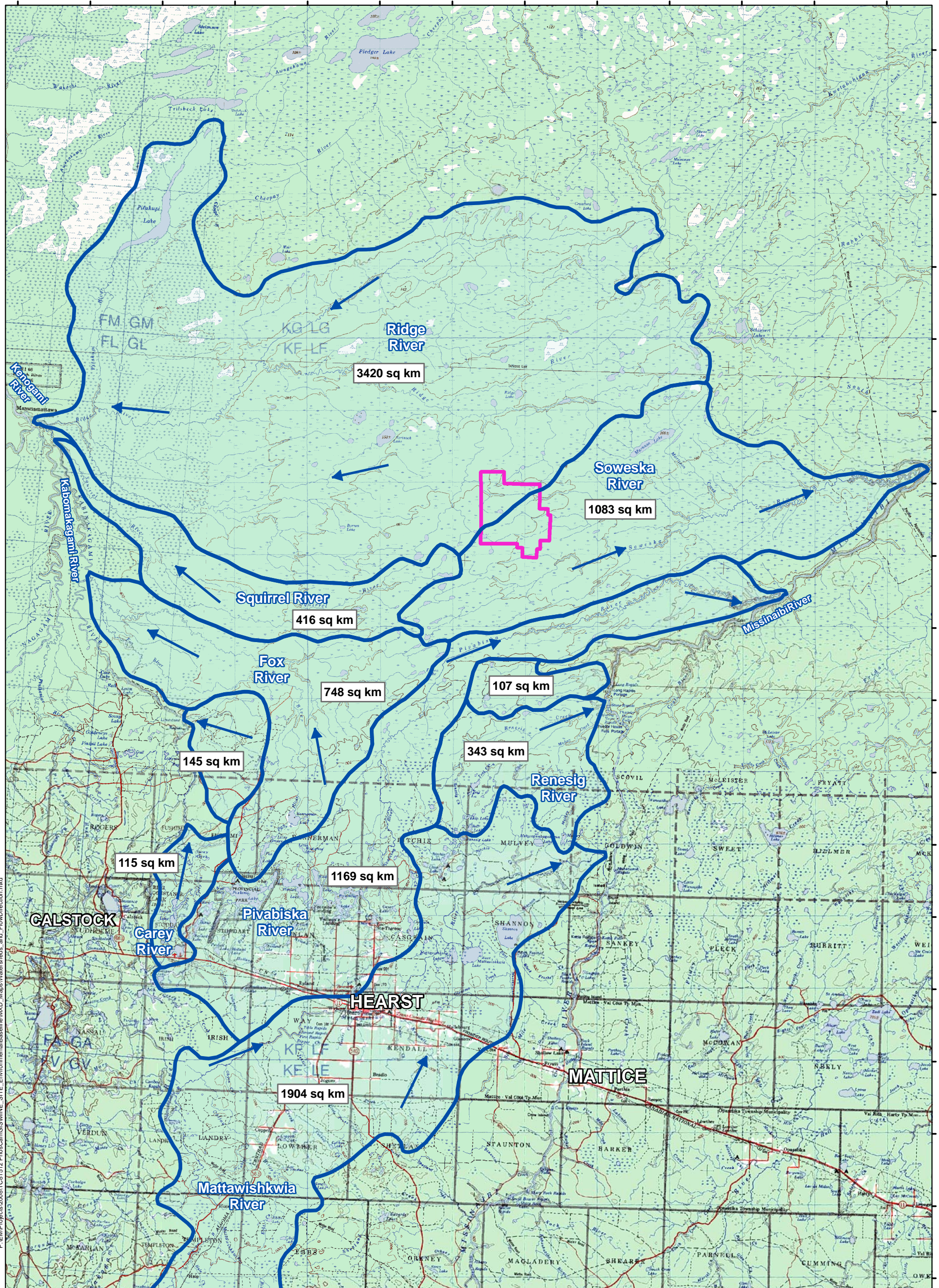
FIGURE: 1-1



Datum: NAD83
Projection: UTM Zone 17(north)






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-  Watersheds
-  Water Flow Direction
-  PhosCan Claim Boundary



MARTISON PHOSPHATE PROJECT

Watershed Delineations and Flow Directions

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DATE: December 2008

PROJECT No: TC81512

FIGURE:1-2



Datum: NAD83
Projection: UTM Zone 17(north)

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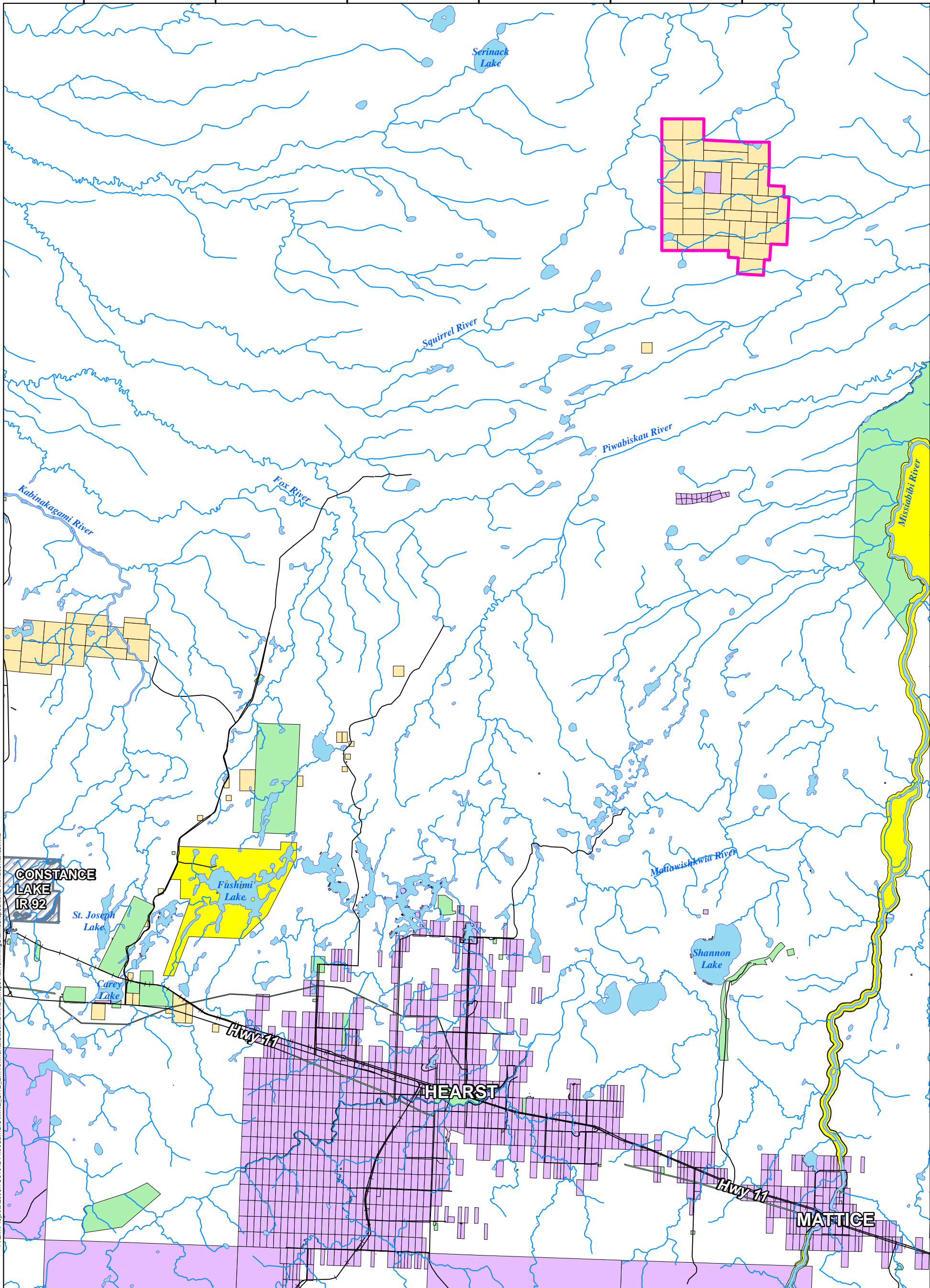
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LEGEND

Alienation Areas of Crown Land

Active withdrawals and Notifications

Disposition Areas of Crown Land

Active Disposition Boundary

Mining Claim Areas of Crown Land

Active Mining Claims Boundary



First Nation Land



PhosCan Claim Boundary



Provincial Park (OBM)

NOTES:
 - Base data from geogratic.ca, National Topographic Database (NTDB) 1:250,000 vector sheets
 - OBM data from Ontario Digital Geospatial database (ODGD)
 - Claims, dispositions and alienation land boundaries extracted from CLAIMAP, Ministry of Northern Development and Mines web application. Data downloaded on August 28, 2008



MARTISON PHOSPHATE PROJECT

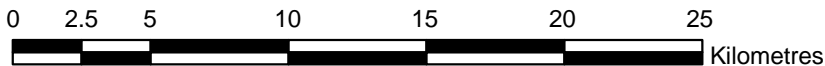
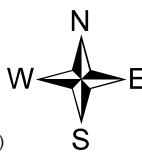
Active Mining Claims, Disposition Lands and Alienation Lands

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DATE: December 2008

PROJECT No: TC81512

FIGURE:1-3



Datum: NAD83
 Projection: UTM Zone 17(north)

2.0 RESULTS

Results provided in this section are focused on the mine exploration site, however, where appropriate given sections will extend beyond the immediate vicinity of the Active Mining Claims to characterize the nature of the regional habitat.

2.1 Landforms, Geology and Soils

The local terrain is subdued with typical slope variations in the area south of the James Bay Lowlands transition being in the order of 5 m vertical per 1,000 m horizontal, and in the area north of the transition being in the order of 2 m vertical per 1,000 m horizontal (Figure 2-1).

Landforms typical of the study area are dominated by:

- Undifferentiated, mainly fine-grained till; and,
- Organic (peatland) terrain (or muskeg).

A large area of coarse (sand and gravel) glaciomarine sediments is shown to the immediate northwest of the mine exploration site (Figure 2-1), but there is little or no overt surface expression of this area near the mine exploration site. Sandy materials with some gravels are, however, evidenced in a number of drill holes at the site, with the “sand” component in such holes ranging from 5 to 25%. These glaciomarine sediments would have been associated with the former Tyrell Sea which invaded the James Bay Lowlands following retreat of the last glacial period some 7,000 to 8,000 years ago.

Rock outcrops in the study area, south of the mine exploration site and north of the James Bay Lowland transition are uncommon due to the low relief and the deeper sequence of sediments in this area.

Soils in the region are described by Clayton et al. (1977) and are characterized by:

- Rockland;
- Orthic gleysols;
- Orthic gray luvisols; and,
- Fibrisols.

Rockland areas typically show from 25 to 90% outcrop, with remaining areas consisting of variably shallow soil types. Orthic gleysols in the area typically consist of moderately calcareous clayey parent materials, sequenced by a surface peaty zone of up to 40 cm in thickness; underlain by a shallow, organic enriched near surface mineral horizon (Ah layer); further underlain by a mottled gray or brownish gleyed zone. Gleysolic soils are formed under generally wet, reducing (low oxygen) conditions, and frequently characterize areas of low relief, associated with tight, poorly drained, fine-grained (clay/silt) soils.

Orthic gray luvisolic soils are also developed on fine-grained soils, but generally in environments of better drainage compared with gleysolic soils, and as a result, well defined leached (eluvic) and accumulation (illuvic) horizons are apparent. In the eluvic surface, or near surface Ae horizon, clay, iron and aluminum minerals are at least partially depleted by the downward, or lateral movement of water through the soil; whereas these same materials (minerals) are accumulated (precipitated) within the underlying Bt horizon.

Fibisolic soils are organic, generally saturated soils characteristic of peatland (muskeg) bog and fen environments, where the depth of the organic horizon is generally greater than 40 cm, and frequently up to 2 to 3 m in thickness in the region. These organic soils occur in scattered depressions within the southern portion of the study area, but become prevalent to dominant within the area north of the James Bay Lowlands transition, in areas of wetland-treed and wetland-shrub vegetation (treed and open muskeg environments), as shown in Figure 2-2.

2.2 Vegetation Communities

The vegetation inventory work consisted of a review of existing data sources directly relevant to the study area, as well as a number of specific field surveys. Representative vegetation communities and their boundaries were classified and assessed in the field, based on an assessment of four study plots within the mine exploration site (Figure 2-3). A Provincially standardized approach based on vegetation, soil and hydrological site characteristics was used to classify these vegetation communities. Characteristic vegetation communities for this region are described by the *Field Guide to Forest Ecosystems of Northeastern Ontario* (FECO; Taylor et al., 2000). As the FECO only classifies mature, undisturbed forests, Ecological Land Classification (ELC) (Lee et al. 1998) classifications were used to describe communities such as wetlands and anthropogenically disturbed areas Figure 2-4.

The mine exploration site study area is poorly drained and is predominately wet and largely comprised of mature black spruce and tamarack (*Larix laricina*) dominated coniferous forest. The lower lying areas are occupied by treed bogs consisting of stunted black spruce, tamarack, leatherleaf (*Chamaedaphne calyculata*), peat-forming mosses, and various sedge species. There are several northeast-southwest trending ridges running through the region, These ridges have slightly higher elevation, often no more than 5 m above the rest of the area and support mature mixed forest habitat types which are dominated by trembling aspen and black spruce (Figure 2-4). None of these ridges run directly through the mine exploration site location.

AMEC's 2008 surveys indicate that the most abundant vegetation cover within the Project area is black spruce forest and associated treed bog habitat. Based on the FEC system, 15 distinct forest vegetation communities were identified in the study area (Table 2-1). Using the Northern Wetland Manual and the Ecological Land Classification Manual, 12 different wetland communities were also observed within the project area.

Detailed vegetation community descriptions are provided in Appendix A.

2.2.1 Plant Species at Risk

No provincially or federally threatened or endangered species were found during the field surveys in the vicinity of the mine exploration site.

2.3 Wildlife

2.3.1 Mammals

Mammal species were identified in the LSA based on visual observations, as well as tracks and scat. Significant wildlife habitat, including snags, burrows and hibernacula were also mapped and recorded. The results are presented in Table 2-2.

Several moose (*Alces alces*) were observed during the aerial surveys as foraging and moving through the Project site. Gray wolf (*Canis lupus*), red fox (*Vulpes vulpes*) and lynx (*Lynx lynx*) have also been observed in close vicinity to the Project area.

Two caribou were sighted in the area north of the mine exploration site during late September 2008 game trail and lichen surveys; and both CLFN and the MNR have recorded caribou in this area previously.

**TABLE 2-1
VEGETATION COMMUNITY TYPES**

Mapped (Figure 2-4)	Habitat Type	FEC/ELCCode	Vegetation Type
Coniferous	Coniferous	V15	Black spruce – herb rich
		V23	Black spruce – labrador tea – speckled alder – stair–step moss
		V24	Black spruce – speckled alder – labrador tea – sphagnum
		V25/SWC4	Black spruce – larch – speckled alder – stair – step moss
		V26	Black spruce – leatherleaf – sphagnum
		V27	Black spruce – labrador tea – feathermoss – sphagnum
Coniferous treed bog	Treed bog	V28/BOT1-1/BOT2-1	Black spruce – Larch- bog rosemary – pale laurel – sphagnum
Shrubby wetland/riparian	Swamp	SWT2-1	Alder organic thicket swamp type
Herb wetland	Fen	FEO1-4	Bog buckbean – sedge open fen type
		FES1-4	Leatherleaf- forb shrub type
	Open bog	BOO1-2	Cotton-grass open bog type
		BOS1-1	Leatherleaf shrub kettle bog type
	Marsh	MAM2-1	Bluejoint mineral meadow marsh type
		MAM2-5	Narrow-leaved sedge mineral meadow marsh type
		MAM2-6	Broadleaved sedge mineral meadow marsh type
		MAM2-7	Horsetail mineral meadow marsh type
MAS2-1	Cattail mineral shallow marsh type		
Open Water	Open water	OAO	Open aquatic

**TABLE 2-2
 COMPILED MAMMAL SPECIES LIST**

Common Name	Scientific Name	Family	Global Rank	Provincial Rank	COSEWIC	COSSARO
Star-nosed Mole	<i>Condylura cristata</i>	Talpidae	G5	S5		
Snowshoe Hare	<i>Lepus americanus</i>	Leporidae	G5	S5		
Eastern Chipmunk†	<i>Tamias striatus</i>	Sciuridae	G5	S5		
Woodchuck	<i>Marmota monax</i>	Sciuridae	G5	S5		
Red Squirrel	<i>Tamiasciurus hudsonicus</i>	Sciuridae	G5	S5		
Beaver	<i>Castor canadensis</i>	Castoridae	G5	S5		
Bog Lemming sp.†	<i>Synaptomys sp.</i>	Muridae				
Woodland Jumping Mouse	<i>Napaeozapus insignis</i>	Dipodidae	G5	S5		
Gray Wolf	<i>Canis lupus</i>	Canidae	G4	S4		
Red Fox	<i>Vulpes vulpes</i>	Canidae	G5	S5		
Black Bear	<i>Ursus americanus</i>	Ursidae	G5	S5		
Marten†	<i>Martes americana</i>	Mustelidae	G5	S5		
White-tailed Deer	<i>Odocoileus virginianus</i>	Cervidae	G5	S5		
Moose	<i>Alces alces</i>	Cervidae	G5	S5		
Woodland Caribou†	<i>Rangifer tarandus caribou</i>	Cervidae	G5T4	S4?	Threatened (Schedule 1)	Threatened

† Species observed in close proximity to Project Site during a previous AMEC study (AMEC 2004)

2.3.2 Birds

Breeding bird surveys were undertaken in June and early July 2008 in accordance with protocols described for the *Ontario Breeding Bird Atlas* (Cadman et al., 1987; Birds Ontario, 2007). A single visit was made to 4 individual point count stations located a minimum of 500 m apart (Figure 2-3). Each point count station was surveyed for 10 minutes. Surveys were completed between 5:00 am and 11:00 a.m. and were undertaken in good weather with warm temperatures, no precipitation, and little or no wind. Birds displaying breeding behaviour such as agitated behaviour, or the maintenance of permanent territories were used to report “probable” breeding activity. The presence of nests, young, or individuals carrying food was reported as “confirmed” breeding activity (Birds Ontario, 2007).

In total, 11 bird species were observed in the vicinity of the mine exploration site. A species list complete with their associated federal and provincial ranks and their protective status have been summarized in Table 2-3. The list was compiled through the breeding bird point counts, visual searches and incidental observations.

**TABLE 2-3
 COMPILED BIRD SPECIES LIST**

Latin Name	Common Name	Global Rank	Provincial Rank	COSEWIC	COSSARO	Other Protective Acts	Breeding Code	Evidence
<i>Tringa melanoleuca</i>	Greater Yellowlegs*	G5	S4B,SZN			MBCA	Probable	A,P
<i>Contopus cooperi</i>	Olive-sided Flycatcher	G4	S5B,SZN			MBCA	Possible	M
<i>Troglodytes troglodytes</i>	Winter Wren	G5	S5B,SZN			MBCA	Possible	M
<i>Regulus calendula</i>	Ruby-crowned Kinglet	G5	S5B,SZN			MBCA	Possible	M
<i>Catharus guttatus</i>	Hermit Thrush	G5	S5B,SZN			MBCA	Possible	M
<i>Parula americana</i>	Northern Parula	G5	S4B,SZN			MBCA	Possible	M
<i>Dendroica coronata</i>	Yellow-rumped Warbler	G5	S5B,SZN			MBCA	Possible	M
<i>Oporornis agilis</i>	Connecticut Warbler*	G4	S4B,SZN			MBCA	Possible	M
<i>Zonotrichia albicollis</i>	White-throated Sparrow	G5	S5B,SZN			MBCA	Possible	M
<i>Junco hyemalis</i>	Dark-eyed Junco	G5	S5B,SZN			MBCA	Confirmed	CF
<i>Carduelis tristis</i>	American Goldfinch	G5	S5B,SZN			MBCA	Observed	X

* Regionally rare species (Cadman et al. 2000)

† Species observed in close proximity to Project Site during a previous AMEC study. (AMEC 2004)

2.3.3 Amphibians / Reptiles

Visual observations were made using binoculars and searches were conducted within wetlands, along the edges of open water (streams, ponds and lakes) and on bare rock, sand and gravel patches to detect basking reptiles. Amphibians were identified through visual observations within wetland and open water areas, as well as through their distinct species calls. Coarse woody debris, including fallen logs and branches were also flipped over during the vegetation surveys to check for salamanders or other amphibians.

Table 2-4 lists all of the amphibian and reptile species observed on site. Several species of amphibians were observed on site including mink frog (*Rana septentrionalis*), spring peeper (*Pseudacris crucifer*), wood frog (*Rana sylvatica*) and American toad (*Bufo americanus*). One reptile, the eastern garter snake (*Thamnophis sirtalis sirtalis*) was also observed on site.

**TABLE 2-4
 COMPILED HERPTILE SPECIES LIST**

Common Name	Scientific Name	Family	Global Rank	Provincial Rank
Eastern Garter Snake	<i>Thamnophis sirtalis</i>	Colubridae	G5T?	S5
American Toad	<i>Bufo americanus</i>	Bufoidea	G5	S5
Spring Peeper	<i>Pseudacris crucifer</i>	Hylidae	G5	S5
Boreal Chorus Frog†	<i>Pseudacris maculate</i>	Hylidae	G5	S5
Northern Leopard Frog†	<i>Rana pipiens</i>	Ranidae	G5	S5
Mink Frog	<i>Rana septentrionalis</i>	Ranidae	G5	S5
Wood Frog	<i>Rana sylvatica</i>	Ranidae	G5	S5

† Species observed in close proximity to Project Site during a previous AMEC study (AMEC 2004)

2.4 Aquatic Environment

The assessment of the mine exploration site included two watercourse stations, and two lake sampling locations (Figure 2-5). The mine exploration site is transacted into two watersheds which include West Lake in the Ridge River watershed to the north and East Lake and watercourses C5 and C6 in the Soweska watershed to the south (Figure 1-2). All of the watercourses and watersheds within the study area ultimately drain easterly to James Bay, via the Albany or Moose Rivers. Low gradient, slow flowing watercourses characterize the regional area. Aquatic resources are summarized below.

The two watercourses sampled in the study are were considered small drainages (drainage areas of 4 to 20 km² at the mine exploration site) with normal wetted widths of less than 10 m unless impounded by beaver activity or within otherwise flooded sections. However, during the field program, the study area had experienced record rainfall which was atypical for the area and the province of Ontario as a whole. As a result, the water level within the channels was considerably higher than for normal summer flow conditions, and measurements obtained are considered more indicative of high flow conditions.

Overall the species complexes are representative of coolwater habitats. The watercourse features are small low gradient drainages that are not associated with any geological features such as eskers that would suggest strong upwelling potential or high value coldwater habitat.

Northern pike and yellow perch were captured in West Lake within the PhosCan mining claim boundary at the mine exploration site. This was the only water body where game fish were encountered.

None of the species encountered during the sampling constitute status species as defined by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), the *Species at Risk Act* (SARA), or by the Committee on the Status of Species at Risk in Ontario (COSSARO). Although Lake Sturgeon (listed as Special Concern) are found in the region, there are generally limited to larger water bodies and are not likely to occur in the immediate area of the mine exploration site.

SOWESKA RIVER DRAINAGES

2.4.1 Station C5

Origin and Flow Status

Station C5 is a tributary of the Soweska River, with a drainage area of approximately 20 km² upstream of the mine exploration site. Downstream of the site, the tributary continues approximately 10 km where it receives flow from the tributary draining from Crossing C6 and East Lake, also located within the mine exploration site. The channel is considered permanent, although some periods of little to no flow are expected during dry periods and specifically winter months. An aerial view of the sampling location and fish community summary is provided in Figure 2-6.

General Habitat Conditions and Morphology

The creek was a uniform habitat type throughout the sample reach and is described in Table 2-5. The channel had an average wetted width of 2 m, with a mean depth of 1.1 m. Bankfull width and depth could not be determined as a result of extensive flooding.

Creek morphology was fast flowing (largely due to high flow), consisting of runs (75%) and flats (25%). Channel substrates were diverse, consisting of boulder (15%), cobble (15%), gravel (20%), sandy gravel (20%), sand (10%), clay (15%) and detritus (10%). The riparian community consisted of a dense alder zone and a forest community dominated by spruce (80%), tamarack (5%), white cedar (5%) and balsam fir (5%).

Fish Community and Fisheries Classification

The fish community at Station C5 was sampled by electrofishing in 2008, and by minnow traps during a 2007 study (Golder 2008). A total of 141 fish were captured during the sampling events, representing a total of 6 species, including pearl dace (90), fathead minnow (8), brook stickleback (10), white sucker (7), longnose sucker (2), and creek chub (24) (Table 2-6). No critical habitats or sensitive species were captured; however, based on the higher diversity and abundance of fish species observed, and the general quality of the habitat, the overall fisheries habitat sensitivity was classified as moderate.

2.4.2 Station C6

Origin and Flow Status

Station C6 is located within the Martison mine exploration site, and drains the bog areas between East and West Lakes, easterly into the west end of East Lake. The drainage area of this channel is <5 km², although it appears that a portion of this drainage area may be shared with West Lake. From East Lake, the tributary extends approximately 10 km east to report to the downstream drainage associated with station C5. This drainage is considered to be intermittent due to the small watershed, but as result of the impounded nature of the drainage, permanent standing water would extend its length. The sampling location is provided in Figure 2-5 with an aerial view and fish community summary provided in Figure 2-7.

General Habitat Conditions and Morphology

The wetted width was 2.5 m, with an average depth of 1 m or less, and a bankfull width and depth of 3.6 m and 1.45 m, respectively (PhosCan 2008).

The creek morphology consisted mainly of flats and pools, with sediments ranging from sand to organics. The riparian community was dominated by dense alder at the crossing location and a forest community of black spruce (~85%) and tamarack (~15%).

TABLE 2-5 HOLLINGER PROJECT BASELINE - BIOPHYSICAL HABITAT

Watershed	Station No.	Date Visited	^Channel Dimensions				Water Chemistry				Stream Morphology				Substrate (%)								Instream Cover (%)				Vegetation Type			Bank Stability		Shoreline Vegetation	Riparian Vegetation			
			Mean Width (m)	Mean Depth (m)	Bankfull Width (m)	Bankfull Depth (m)	pH	D.O. (mg/L)	Water Temp. °C	Air Temp. °C	Cond. (uS)	Riffles	Runs	Pools	Flats	Bedrock	Boulder	Cobble	Gravel	Sandy Gravel	Sand	Silt	Clay	Muck	Detritus	Undercut Banks	Cobble	Boulders	Logs and Trees	Organic Debris	Vascular Plants			None	Sub	Float
Soweska	C5	10-Jul-08	2	1.1	ND	ND	6	8	14.1	20	19	75	25		15	15	20	20	10		10	10	5	10	10	10		10	55	50		50	100		Dense alders	75% Sb, 10% Ta, 5% Sw, 5% cedar, 5% Bf
	**C6	-	2.5	<1	ND	ND							100					20				80	80					20	-	-	-	100		Dense alders	85% Sb, 15% Ta	

^ = In cases of temporary flooding (i.e., beaver impoundments) the values reported are for the defined channel where evident.
 ND = Values could not be determined due to field conditions.
 Sb = Black Spruce, Sw = White Spruce, Ta = Tamarack, At = Trembling Aspen, Wc = White Cedar, Wb = White Birch, Bp = Bal
 ** = Data from Golder 2008 Report

Fish Community and Fisheries Classification

Fish sampling resulted in the capture of 5 brook stickleback in the vicinity of the crossing (Golder 2008) (Table 2-6). Due to the probable intermittency of the channel, and the low diversity and numbers of fish captured, the crossing was classified as having low sensitivity.

2.4.3 East Lake

Origin and Flow Status

East Lake is a small on-line water body flowing north/northeast and contributing to the Soweska River watershed. The lake is fed by bog drainage (Station C6 tributary), and then drains southeast approximately 10 km to report to a larger tributary (Station C5 tributary) of the Soweska River. A fisheries habitat summary is provided in Table 2-5. An aerial view of the lake is provided as Figure 2-8.

General Habitat Conditions

The lake has a maximum depth of 1 m and a mean depth of 0.6 m, which likely results in the majority of the lake freezing to or near bottom in most winters. The entire lake is fringed by wide semi-floating mats of shrub and herbaceous vegetation (Figure 2-8). The open water portion of the lake contains small sporadic patches of aquatic macrophytes with a substrate comprised of soft organics and detritus.

The shoreline is of uniform composition, comprised mainly of sedges and grasses, with a detritus substrate. The riparian zone on average was 20 m wide, with little to no gradient, and consisted predominantly of flooded grasses and sedges. The surrounding forest community was dominated by black spruce (80%) and tamarack (20%).

Fish Community and Fisheries Classification

Electrofishing was conducted along the shorelines of East Lake using an electrofishing boat, which resulted in the capture of 116 fish of 4 species, including finescale dace (2), pearl dace (2), brook stickleback (99), and white sucker (10) (Table 2-6). The shallow mean depth and high proportion of catch composed of stickleback (a hardy species tolerant to low dissolved oxygen concentrations) suggests that much of the lake area becomes unavailable to fish during the winter months. No critical habitat was identified within the lake, which provides general habitat for the species observed. Accordingly, the fish habitat sensitivity of the lake was classified as moderate.

RIDGE RIVER DRAINAGES

2.4.4 West Lake

Origin and Flow Status

West Lake is an on-line, headwater bog lake located on the south/east fringe of the Ridge River watershed with a westerly outflow. The lake receives the majority of the site drainage from within the Martison property claim boundary, with an approximate drainage area of 7 km². Several small muskeg drainages feed the lake, which has an open water surface area of approximately 30 ha, and a perimeter of approximately 2.3 km. The lake is fringed by a semi-floating zone of shrubs (Labrador tea) and aquatic vegetation measuring approximately 4.7 ha in area with a perimeter of approximately 2.5 km. A fisheries habitat summary is provided in Table 2-5. An aerial view of the lake is provided as Figure 2-9.

General Habitat Conditions

The lake is shallow, with a maximum depth of 1 m and a mean depth of 0.8 m. The bed material consisted primarily of muck and detritus. The aquatic vegetation community consisted of floating and emergent macrophytes.

The riparian community consisted of grasses, sedges and Labrador tea, with an average width of approximately 5 m, but extended up to 400 m into the adjacent trees (Figure 2-9). The forest community on the north side of the lake consisted mainly of a black spruce swamp, while the south side of the lake consisted of approximately 70% black spruce and 30% tamarack.

Fish Community and Fisheries Classification

Electrofishing was conducted along the shorelines of West Lake using an electrofishing boat, which resulted in the capture of 14 yellow perch and 2 northern pike (Table 2-6). Previous sampling in 2007 (Golder 2008) resulted in the capture of 5 yellow perch and 5 northern pike. The shallow mean and maximum depths suggest that much of the lake area becomes unavailable to fish during the winter months. The lake provided general habitat for the species observed, with an abundance of suitable pike spawning habitat along the flooded margins of the lake. No small-bodied or forage fish were observed in the lake, and it is probable that the pike and perch populations are largely cannibalistic. Accordingly, the fish habitat sensitivity of the lake was classified as moderate.

**TABLE 2-6
 FISH COMMUNITIES**

Watershed	Crossing No.	Fishing Effort				Species								
		Electrofishing		Minnow Traps		Finescale Dace	Pearl Dace	Fathead Minnow	Brook Stickleback	White Sucker	Longnose Sucker	Creek huck	Yellow Perch	Northern Pike
		Length in (m)	Time(s)	No. Traps	Time(hr)									
Soweska River	C5-US	100	356	*			*90	2(*6)	4(*6)	7	*2	*24		
	*C6			*					*5					
	East Lake		1130			5	2		61(*38)	10				
Ridge River	West Lake		2942										14(*5)	2(*5)

* Data from Golders 2008 Report (minnow traps)
 DS = downstream; US = upstream

2.5 Species at Risk

Table 2-7 lists the federal and provincial Species at Risk which are potentially present in the region. Appendix B also lists all of the provincially rare species from the Ontario Natural Heritage Information Centre (NHIC) database that may occur on site.

Species at Risk are plant or animal species whose individuals or populations are considered Extirpated, Endangered, Threatened, or of Special Concern in Canada, as determined by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC 2006). Species at Risk and activities within their critical habitat are regulated by the federal *Species at Risk Act (SARA)*. Wildlife species that are considered at risk have been listed under either Schedules 1, 2, or 3 of *SARA*. These federal regulations apply on all federal lands. On private land, these prohibitions apply **only** to listed, Schedule 1, endangered or threatened **aquatic and bird species**.

The Province of Ontario has its own species assessment body, the Committee on the Status of Species at Risk in Ontario (COSSARO). The national and provincial species lists are similar; however, the scope of assessment differs. Under the new Ontario *Endangered Species Act* (June 2007), the habitat of any endangered or threatened species is now protected. The regulations may specifically prescribe the area as the habitat of a species. However, if no habitat regulation is in effect, then a "habitat" is defined to mean an area on which the species depends, directly or indirectly, to carry on its life processes.

Both the federal and provincial *Species at Risk Acts* declare that once a species has been designated as endangered or threatened (under SARA the species must also be a Schedule 1 species), a recovery strategy must be issued to identify what needs to be done to arrest or reverse the decline of a species, including the identification of its critical habitat. Critical habitat is the habitat necessary for survival of a species, under SARA, and activities that destroy critical habitat may be prohibited. Once the recovery strategy has been released a habitat regulation may also be developed that may prohibit certain activities within the identified critical habitat of a SAR species.

A summary of all “Species at Risk” observed, known, or suspected as being potentially present in the site area is provided in Table 2-7.

The most significant of the identified species is the woodland caribou because of its known presence in the area, and its vulnerability to habitat change and other disturbances. Wolverine, although unlikely to occur in the immediate Project area, are also discussed below because of their dependence on terrestrial habitats and the possibility that this species may be extending its range further eastward in recent years. The remaining species, if present, occur in habitats that would be unlikely to adversely be affected by road and aggregate pit development.

**TABLE 2-7
 SUMMARY OF POTENTIAL SPECIES AT RISK IN PROJECT AREA**

Species Common Name	Species Scientific Name	Classification	Likelihood of Presence in Local Project Area
Plants (none - for species considered rare see Appendix B)			
Fish			
Lake Sturgeon	<i>Acipenser fulvescens</i>	Special Concern (SARO)	Low
Reptiles and Amphibians (none – Appendix B)			
Birds			
Golden Eagle	<u>Aquila chrysaetos</u>	Not at Risk (SARA) Endangered (SARO)	Low
Bald Eagle	<u>Haliaeetus leucocephalus</u>	Not at Risk (SARA) Special Concern (SARO)	Moderate
Black Tern	<u>Chlidonias niger</u>	Not at Risk (SARA) Special Concern (SARO)	Moderate
Mammals			
Woodland Caribou	<i>Rangifer tarandus</i>	Threatened (SARA) Threatened (SARO)	High
Wolverine	<i>Gulo gulo</i>	Special Concern (SARA) Threatened (SARO)	Low

Caribou

The Project site is located in the boreal forest where woodland caribou (*Rangifer tarandus*) reside. As development activities through mining and forestry continue to be undertaken in the boreal region of Canada, caribou have become a central conservation focus for government and non-government organizations. MNR indicated through their Screening Report that site-specific caribou studies and monitoring are required.

Woodland caribou are currently designated both federally and provincially as a Species at Risk. At the federal level, COSEWIC (Committee on the Status of Endangered Wildlife in Canada) has designated woodland caribou as threatened, Schedule 1, and at the provincial level COSSARO (Committee on the Status of Species at Risk in Ontario) has also designated this species as threatened. Additionally, in Ontario, this species is protected by the *Ontario Fish and Wildlife Conservation Act*.

The recovery strategy for Woodland Caribou was released in July 2008 (Ontario Woodland Caribou Recovery Team 2008). This strategy outlines an approach to identifying recovery habitat and provides recommendations on that habitat should be protected. Recovery zones have been proposed to provide geographical context for future action planning with the biological unit of conservation being the local population and the range. A range is defined as *a broad geographical area used and/or required for self-sustaining local population of woodland caribou and providing for both present and future habitat needs* (Ontario Woodland Caribou Recovery Team 2008). Local population ranges are considered equivalent to recovery habitat for this species. The recovery strategy also stipulates that “protection” means to protect ranges and their associated components and essential habitat functions through management of human activity and not by prohibiting all activity.

The caribou residing in the vicinity of the mine exploration site are part of the north-eastern recovery zone. The primary literature search and consultation with CLFN and OMNR did not reveal any known caribou calving areas. However, there is one known over-wintering area near the Forks of the Albany identified by Magoun et al. (2005) which is located approximately 45 km northwest of the Project site (Figure 2-10). Several winter caribou sightings were also noted by Magoun et al. (2005) in the James Bay Lowlands, directly east of the aforementioned core over-wintering area, within a zone extending to within approximately 30 km north of the PhosCan Martison site mineral claim block. CLFN members have also occasionally observed caribou in the area, but do not often hunt them locally as they are not sufficiently abundant.

Data on the local caribou population is scarce, however given that individuals have been observed in the area, any proposed activities for the mine exploration site must be assessed with respect to their potential impacts on caribou.

Late Winter Habitat and Movement Corridor Mapping

Several caribou site-specific surveys were undertaken in late September 2008, focusing on the mapping of late winter caribou habitat and potential movement corridors (Figure 2-11). Identifying late winter caribou habitat is imperative for mitigating and minimizing the risk of impacting local caribou around the Project site. High quality late winter caribou habitat is characterized by large lichen mats, which typically occur on areas of raised ground, such as along well drained ridges, particularly if coarse substrates (sandy materials are present)(Figure 2-12). These lichen mats are readily apparent from the air, and can be observed on satellite images if they are sufficiently extensive, and if the imaging is of high quality (resolution). Lichen patches can also occur in bog

areas, on sphagnum moss hummocks. Lichens also grow on spruce, tamarack and other tree and shrub species, where they are referred to as old man's beard.

Similarly, movement corridors can be quantified by mapping game trails which can be observed along the edges of bogs and other natural areas (Figure 2-13). These trails are often created by caribou or moose, but are then used by other species of wildlife species. Some game trails are used repetitively over decades and can be used to estimate the movement patterns of wildlife (including caribou) over a region.

An aerial (helicopter) survey was undertaken in late September 2008 (from September 10 to 14) to map these important caribou habitat attributes. Lichen patches were documented within a 50 km long by 4 km wide survey zone, centred southwest of the mine exploration site. All lichen patches observed within the extent of the survey were comparatively small and scattered, indicating limited food potential for caribou. The reason for this is that esker and esker-like systems, that frequently support extensive lichen patches, are absent from this area.

The trail survey was also carried out in late September (September 10 to 14) and covered an area measuring 70 km in length and 20 km in width, centred southwest of the site and extending 30 km northeast of the mine exploration site. Sightings of caribou and moose were noted during the survey. The majority of trails were observed in more open muskeg terrain, there may have been additional trails in the dense coniferous stands, but these are not visible from the air. Ten moose and two caribou were observed during the survey, with moose sightings occurring throughout the area, and the two caribou sightings occurring in the area to the north of the Martison mineral claim block. Moose were sighted in both open (bog and fen) and closed (forested) terrain, whereas caribou were only sighted in the open muskeg habitat. The occurrence of observed trails indicates a potential for longer-term caribou use of the area. But it is not possible to assign the origin of the trails to either caribou or moose.

Wolverine

Wolverine (*Gulo gulo*) is currently federally listed as species of special concern (no schedule yet) and provincially listed as threatened. This species requires large, relatively undisturbed areas to maintain viable populations because of its low reproductive rate, low population density, and large home range. It inhabits a variety of treed and treeless areas at all elevations including the northern forested wilderness, the alpine tundra of the western mountains, and the arctic tundra. Wolverine are most abundant where large ungulates are common. Though there is available habitat and food for this species within the Project area, local First Nation trappers have not observed it in the area. Additionally, MNR does not have records of this species occurring in study area, although it is believed by MNR that this species range is gradually moving eastward. No specific surveys were undertaken for this species the likelihood of this species occurring within the vicinity of the mine exploration site is very low.

2.6 Hydrology

Hydrological data are important for determining watershed relationships for general site drainage, as well as for culvert sizing for creek crossings.

At the regional scale, the local watersheds drain either west to the Kabinakagami River (Carey Creek, Fox River, Squirrel River and Ridge River watersheds), or east to the Missinaibi River (Mattawishkwia River, Pivabiska River, Renesig Creek and Soveska River watersheds).

The average annual runoff for the region, based on Water Survey of Canada flow records for the Missinaibi River at Mattice (Station 04LJ001), the Mattawishkwia River at Hearst (Station 04LK001), and the Kabinakagami River at Highway 11 (Station 04JA002), all located in the general area of Hearst, is 389 mm/yr.

Extreme rainfall statistics for the closest station to Hearst (i.e., for Kapuskasing Airport, approximately 95 km to the east) are available from the Canadian Atmospheric Environment Service (AES) for the period 1966 to 2003, and are shown below in Table 2-8.

**TABLE 2-8
 KAPUSKASING AIRPORT 24-HR EXTREME VALUE RAINFALL STATISTICS (mm)**

Return Period (years)	2	5	10	25	50	100
Duration – 1 hr	16.8	22.6	26.4	31.3	34.9	38.4
Duration – 6 hrs	29.1	36.9	42.1	48.6	53.5	58.3
Duration – 12 hrs	35.4	45.3	51.8	60.0	66.1	72.2
Duration – 24 hrs	41.1	53.8	62.2	72.8	80.6	88.4

Notes: Data provided by AES for the period 1966 – 2003 based on the modified Gumbel statistical distribution

2.7 Water and Sediment Quality

2.7.1 Water Quality

Water chemistry was analyzed for general chemistry and metals from two watercourse and two lake sample stations (Table 2-9). Water quality is discussed with respect to the Provincial Water Quality Objectives (PWQO).

There are no industrial developments in the area, and thus the results collected to date are considered to be representative of background conditions. The data are unremarkable, being typical of regional background environmental conditions and meeting Provincial Water Quality Objectives (PWQO) for the protection of aquatic life.

The low pH values for the watercourses and lakes, ranging from pH 4.95 to pH 6.03, as compared to PWQO values of 6.5 to 8.5, are typical of natural systems which receive a significant portion of their drainage from muskeg (bog and fen) environments. The higher dissolved organic carbon

values for these samples, ranging from 22.0 to 28.1 mg/L, are also indicative of organic terrain drainage.

2.7.2 Sediment Quality

Sediment samples were collected from two watercourses and two lake habitats and submitted for chemical and physical analysis, as presented in Tables 2-10 and 2-11. Grain size analysis results indicate that the depositional substrates were composed, on average, of silts (19%) and fine sands (26%), with components of clay (7%), medium sand (20%), coarse sand (9%), and gravel (28%). Loss on Ignition (LOI), a measure of organic content, was generally low (less than 20%).

Chemistry results were compared to Provincial Sediment Quality Guidelines (PSQG) for each parameter, where applicable. The PSQG's provide criteria defined as the Lowest Effect Level (LEL) and the Severe Effect Level (SEL) and are described as follows:

- LEL – Lowest Effect Level indicating concentration in the sediment that can be tolerated by the majority of benthic organisms; and,
- SEL – Severe Effect Level indicating a concentration in the sediment at which pronounced disturbance of the sediment-dwelling community can be expected.

There were no distinct trends between watersheds in sediment chemistry, however, the lake stations were both elevated in organic and nutrient parameters. Most sediment parameters were well within the applicable provincial PSQG criteria, with the exception of total organic carbon (TOC) and total kjeldahl nitrogen (TKN), which exceeded the LEL criteria in all samples. All other parameters met provincial guidelines. All results are considered to represent the natural background conditions of the region.

**TABLE 2-9
WATER CHEMISTRY OF LAKES AND TRIBUTARY CROSSINGS**

Sample ID Date Collected (2008)			PWQO Criteria	Soweska River Watershed			Ridge River
Crossing Type				C5	*C6	East Lake	West Lake
Parameters	Unit	MDL*		10-Jul-08	05-Jun-07	07-Jul-08	07-Jul-08
Ammonia as N	(mg/L)	0.01	-	<0.01	0.01	<0.01	0.03
Chloride	(mg/L)	0.1		0.1	<0.2	0.3	0.3
Conductivity	(µS/cm)	5		24	19	20	19
Dissolved Organic C	(mg/L)	0.5		26.1	22	28.1	25.6
Nitrate as N	(mg/L)	0.1		<0.1	<0.1	<0.1	<0.1
Nitrite as N	(mg/L)	0.1		<0.1	<0.03	<0.1	<0.1
pH		-	6.5 - 8.5	6.03	5.24	4.95	5.53
Phosphate	(mg/L)	0.1		0.2	<1	<0.1	0.2
Sulphate	(mg/L)	0.1		0.1	<1	0.1	0.1
Total Alkalinity (CaC	(mg/L)	5		7	22	<5	<5
Total Dissolved Solid	(mg/L)	10		16	64	13	12
Total Hardness (Ca	(mg/L)	0.3		15.9	9.2	9.0	9.6
Total Organic Carbon	(mg/L)	0.5		26.9	na	28.6	25.9
Total Phenols	(mg/L)	0.001	1	<0.001	na	<0.001	<0.001
Total Suspended Sol	(mg/L)	2		<2	<6	<2	3
Aluminum	(µg/L)	1	75 ^{^^}	58	92	29	45
Antimony	(µg/L)	1	20	1	<0.5	<1	<1
Arsenic	(µg/L)	1	100 (5 ^{^^})	<1	<1	<1	<1
Barium	(µg/L)	0.5		<0.5	1.6	<0.5	<0.5
Beryllium	(µg/L)	0.1	11	<0.1	<0.5	<0.1	<0.1
Bismuth	(µg/L)	0.5		<0.5	<1	<0.5	<0.5
Boron	(µg/L)	2	200 ^{^^}	11	3	8	6
Cadmium	(µg/L)	0.1	0.2 (0.1 ^{^^})	<0.1	<0.1	<0.1	<0.1
Calcium	(µg/L)	500		4730	2850	2660	2880
Chromium	(µg/L)	1	8.9 (as Cr III)	<2	1	<1	<1
Cobalt	(µg/L)	0.7	0.9	<0.7	<0.7	<0.7	<0.7
Copper	(µg/L)	1	5 (1 ^{^^})	3	<1	<1	<1
Iron	(µg/L)	1	300	88	180	56	57
Lead	(µg/L)	2	5	<2	<1	<2	<2
Lithium	(µg/L)	5		<5	<5	<5	<5
Magnesium	(µg/L)	20		1000	745	574	582
Manganese	(µg/L)	1		8	16	4	8
Mercury	(µg/L)	0.02	0.2	<0.02	<0.1	<0.02	<0.02
Molybdenum	(µg/L)	2	40 ^{^^}	<2	<1	<2	<2
Nickel	(µg/L)	1	25	<1	<1	<1	<1
Phosphorus	(µg/L)	2	20 ^{^^} (lakes)	17	na	6	13
Potassium	(µg/L)	20		76	na	92	433
Rubidium	(µg/L)	2		<2	<1	<2	<2
Selenium	(µg/L)	1	100	<1	<1	<1	<1
Silver	(µg/L)	0.1	0.1	<0.1	0.3	<0.1	<0.1
Sodium	(µg/L)	500		485	na	616	836
Strontium	(µg/L)	1		2	7	<1	<1
Thallium	(µg/L)	0.5	0.3 ^{^^}	<0.5	<0.1	<0.5	<0.5
Tin	(µg/L)	2		<2	<1	<2	<2
Titanium	(µg/L)	2		<2	<2	<2	<2
Tungsten	(µg/L)	0.1	30 ^{^^}	0.4	3.3	<0.1	0.2
Uranium	(µg/L)	1	5 ^{^^}	<1	<1	<1	<1
Vanadium	(µg/L)	2	6 ^{^^}	<2	<1	<2	<2
Zinc	(µg/L)	1	30 (20 ^{^^})	3	<1	4	7
Zirconium	(µg/L)	0.1	4 ^{^^}	<0.1	2.9	<0.1	<0.1

NOTE: Anomalous values not included in Observed Range, Mean, and 75th Percentile calculations.

PWQO: Provincial Water Quality Objectives

*: Where nitrate and nitrite are both present, the total of the two should not exceed 10 mg/L (as nitrogen)

^^: PWQO is an Interim value.

**TABLE 2-10
SEDIMENT QUALITY RESULTS (2008)**

Sample ID:	Units	PSQG	PSQG	CEQG	C5	*C6	WEST LAKE	EAST LAKE
Date		LEL	SEL	PELc	7/10/2008	9/9/2007	7/7/2008	7/7/2008
Parameters								
Loss of Ignition (LOI)	%				17.2	na	65.6	80.2
pH	pH Units				5.8	na	4.8	4.8
Total Organic Carbon	% solids	1	10		6.1	32.4	33	40
Total Kjeldahl Nitrogen	µg/g	550	4600		3530	na	14100	9720
Aluminum	µg/g				5620	2620	4730	2150
Antimony	µg/g				<0.5	<0.5	<0.5	<0.5
Arsenic	µg/g	6	33	17	<0.5	0.5	2.6	2.7
Barium	µg/g				79.8	19.3	41.3	43.5
Beryllium	µg/g				<0.2	<0.5	<0.2	<0.2
Bismuth	µg/g				<0.2	<0.5	<0.2	<0.2
Cadmium	µg/g	0.6	10	3.5	0.6	0.6	1.0	0.7
Calcium	µg/g				6650	8320	11900	11700
Chromium	µg/g	26	110	90	13	7	9	5
Cobalt	µg/g				5	1	4	2
Copper	µg/g	16	110	197	5	5	8	8
Iron	µg/g	20000	40000		9760	2430	5450	2730
Lead	µg/g	31	250	91.3	8	9	21	13
Magnesium	µg/g				2690	1390	1370	892
Manganese	µg/g	460	1100		415	60	239	78
Mercury	µg/g	0.2	2	0.4	0.04	0.05	0.13	0.11
Molybdenum	µg/g				<2	<0.5	<2	<2
Nickel	µg/g	16	75		7	4	9	7
Phosphorus	µg/g				397	741	552	587
Potassium	µg/g				512	na	538	275
Selenium	µg/g				<0.5	<0.5	1.1	1.2
Silver	µg/g				<0.25	<0.5	<0.25	<0.25
Sodium	µg/g				198	na	167	190
Vanadium	µg/g				15	2	8	<5
Zinc	µg/g	120	820	315	48	21	52	28

bold Exceeds the PSQG LEL

bold & block Exceeds PSQG LEL and SEL

* Data from Golders 2008 Report

na = parameter not analyzed

**TABLE 2-11
SEDIMENT GRAIN SIZE DISTRIBUTIONS**

Watershed	Sample Number	Date (dd/mm/yr)	Substrate Fraction %						
			Clay	Silt	Sand (Fine)	Sand (Medium)	Sand (Coarse)	Gravel (Fine)	Gravel (Coarse)
			1 - 2 um	2 - 75 um	75 - 425 um	0.425 - 2.0 mm	2.0 - 4.75 mm	4.75 - 19.0 mm	19.0 - 106 mm
Soweska R.	C5	17-Jul-08	2.0	7.0	25.0	13.0	8.0	45.0	0.0
Soweska R.	*C6	20-Sep-07		trace	85.0	13.0	2.0	trace	
Soweska R.	East Lake	17-Jul-08		12.0	28.7	56.0	3.2		
Ridge River	West Lake	17-Jul-08	<1	27.0	36.3	36.4	<1		
Mean			2	15	44	30	4	45	0

* Data from Golders 2008 Report

2.8 Cultural Heritage, Archaeology and Traditional Ecological Knowledge and Traditional Activities

Ethno-historic documentation of CLFN use of lands in the general vicinity of the mine exploration site, and associated archaeological studies, were carried out for the CLFN by the Mackenzie Ward Group, Professor Scott Hamilton from Lakehead University, and White Spruce Archaeology. Additional traditional land use and occupancy data were assembled by Wolverine & Associates Inc.

General findings from the above studies included the following:

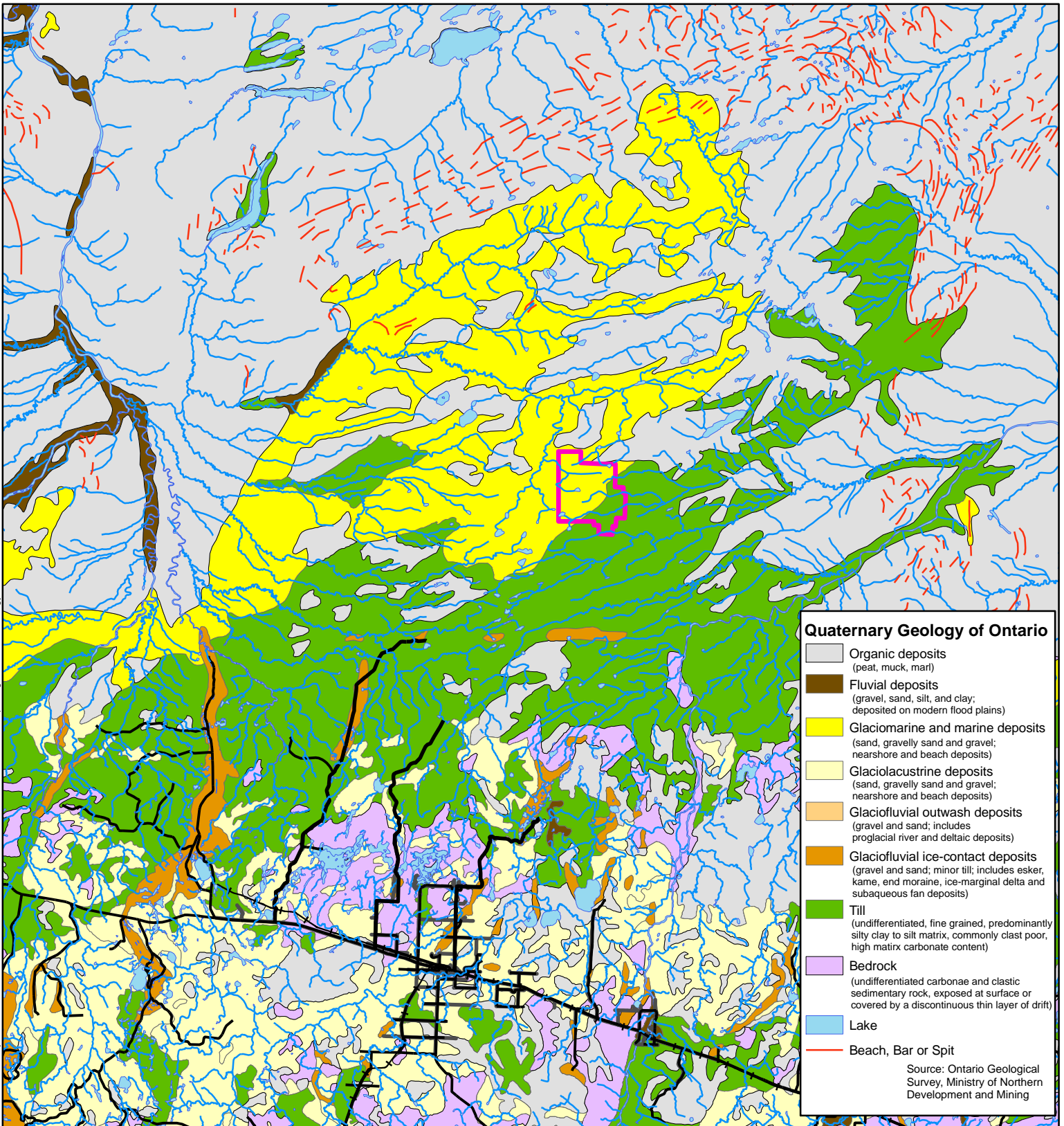
- Much of the landscape in the general vicinity of the mine exploration site are difficult to access and generally resource poor;
- Area access by CLFN members is generally in winter, by snowmobile and snowshoes for the purpose of hunting and trapping;
- Fisheries values are low; and,
- No archaeological sites were found.

Traditional land use and occupancy and Traditional Ecological Knowledge (TEK) of the area is held by the members of the CLFN.

2.9 Culturally Significant Areas

No culturally significant areas or archaeological sites have been identified within the mine exploration site vicinity.

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Quaternary Geology of Ontario

- Organic deposits
(peat, muck, marl)
- Fluvial deposits
(gravel, sand, silt, and clay;
deposited on modern flood plains)
- Glaciomarine and marine deposits
(sand, gravelly sand and gravel;
nearshore and beach deposits)
- Glaciolacustrine deposits
(sand, gravelly sand and gravel;
nearshore and beach deposits)
- Glaciofluvial outwash deposits
(gravel and sand; includes
proglacial river and deltaic deposits)
- Glaciofluvial ice-contact deposits
(gravel and sand; minor till; includes esker,
kame, end moraine, ice-marginal delta and
subaqueous fan deposits)
- Till
(undifferentiated, fine grained, predominantly
silty clay to silt matrix, commonly clast poor,
high matrix carbonate content)
- Bedrock
(undifferentiated carbonate and clastic
sedimentary rock, exposed at surface or
covered by a discontinuous thin layer of drift)
- Lake
- Beach, Bar or Spit

Source: Ontario Geological Survey, Ministry of Northern Development and Mining

LEGEND

- Road (MNR)
- Railroad
- PhosCan Claim Boundary
- Watercourse



Datum: NAD83
Projection: UTM Zone 17(north)



MARTISON PHOSPHATE PROJECT

Regional Surficial Geology

SCALE: 1:750,000

DATE: December 2008

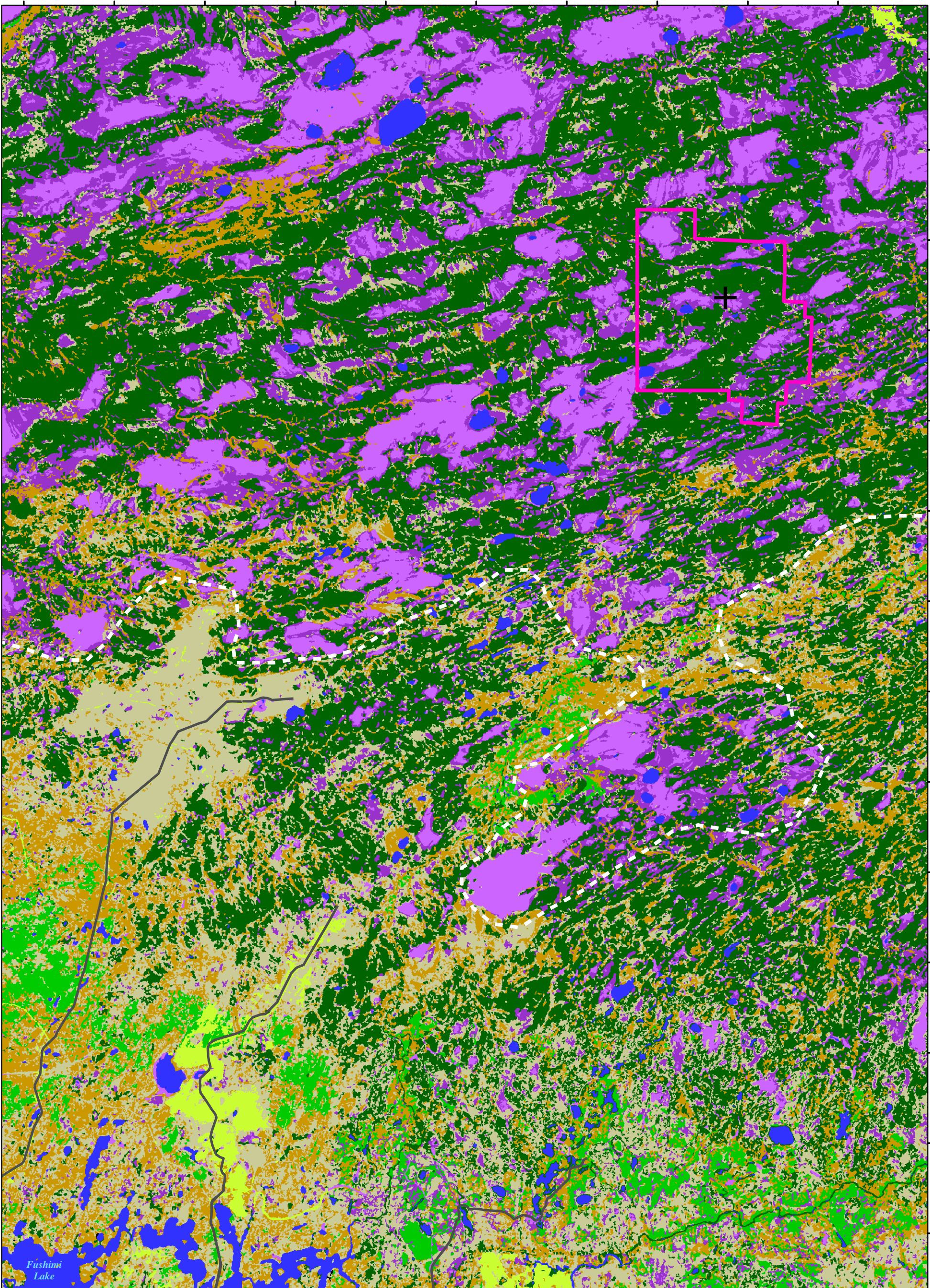
PROJECT No: TC81512

FIGURE:2-1

290000 295000 300000 305000 310000 315000 320000 325000 330000 335000

5590000
5585000
5580000
5575000
5570000
5565000
5560000
5555000
5550000
5545000
5540000
5535000
5530000
5525000

P:\EM\Projects\2008\TC81512 PhosCan\GIS\MINE_SITE_Environmental\Baseline\MXD_Maps\LandCover_Information.mxd



LEGEND

- + Pit
- Regional Roads (OBM)
- Railroad (OBM)
- PhosCan Claim Boundary
- James Bay Lowlands Transition Line

Vegetation and Land Cover Classification

(Earth Observation for Sustainable Development of Forests - EOSD) *

Shadow	Bryoids	Wetland-Herb	Broadleaf Dense
Cloud	Shrub Tall	Herb	Broadleaf Open
Water	Shrub Low	Coniferous Dense	Mixedwood Dense
Rock/Rubble	Wetland-Treed	Coniferous Open	Mixedwood Open
Exposed Land	Wetland-Shrub	Coniferous Sparse	Mixedwood Sparse

* EOSD Land Cover Classification is a Canadian Forest Service and Canadian Space Agency joint project. Land cover was classified using LANDSAT 7 (ETM+) Imagery and represent year 2000 conditions.



MARTISON PHOSPHATE PROJECT

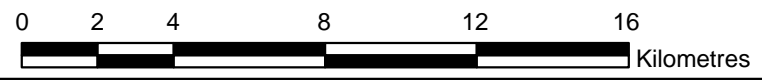
Land Cover Information

SCALE: 1:200,000

DATE: December 2008

PROJECT No: TC81512

FIGURE: 2-2



Datum: NAD83
Projection: UTM Zone 17(north)



324000

326000

328000

330000

332000

334000

5580000

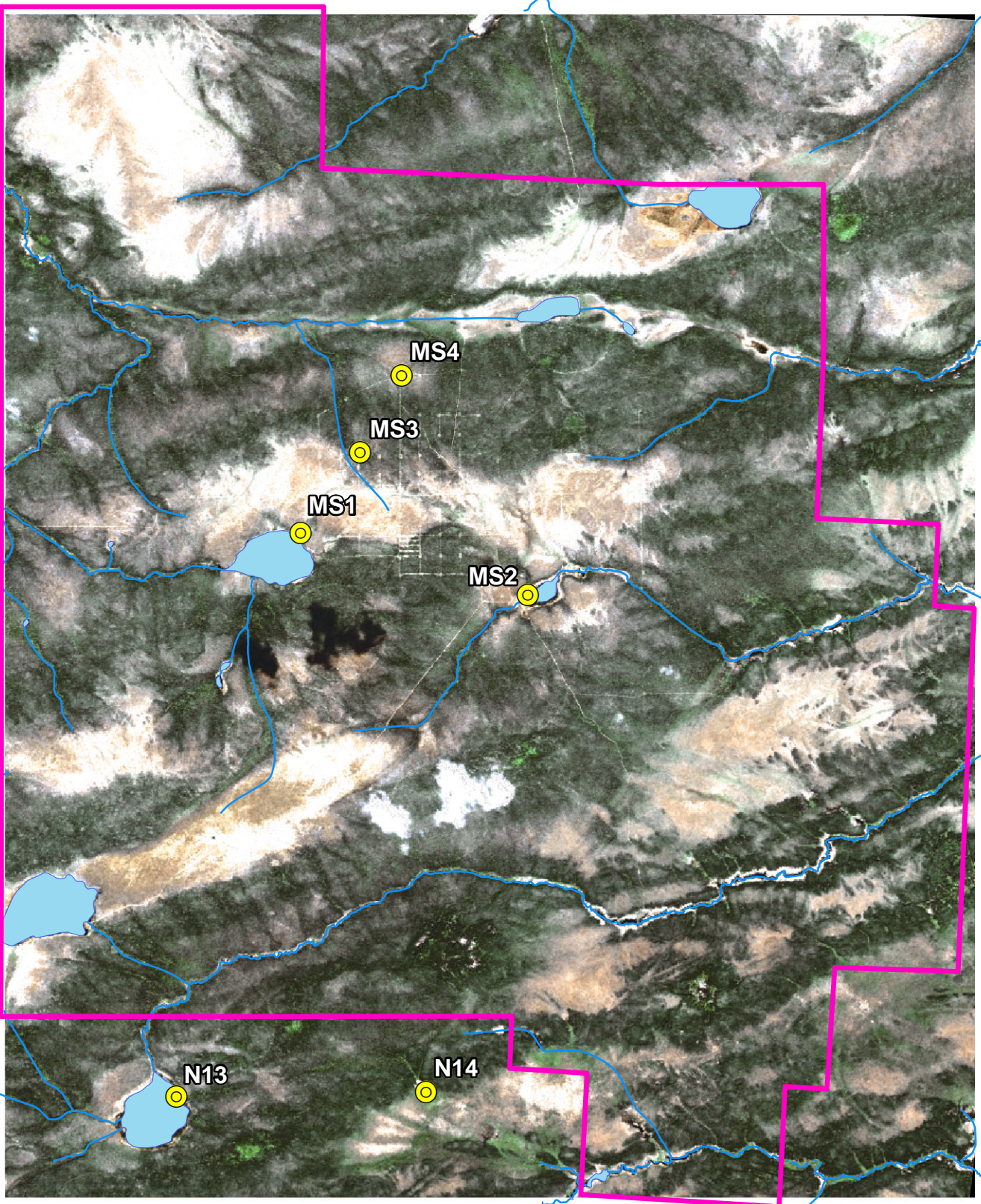
5578000

5576000

5574000



5572000

5570000



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LEGEND

-  Survey Station (Labeled with ID)
-  PhosCan Claim Boundary

NOTES:
 - OBM data extracted from the Ontario Digital Geospatial Database (ODGD - OBM)



MARTISON PHOSPHATE PROJECT

Vegetation Classification/Inventory and Breeding Bird Point Count Survey Locations

SCALE: 1:56,000

DATE: December 2008

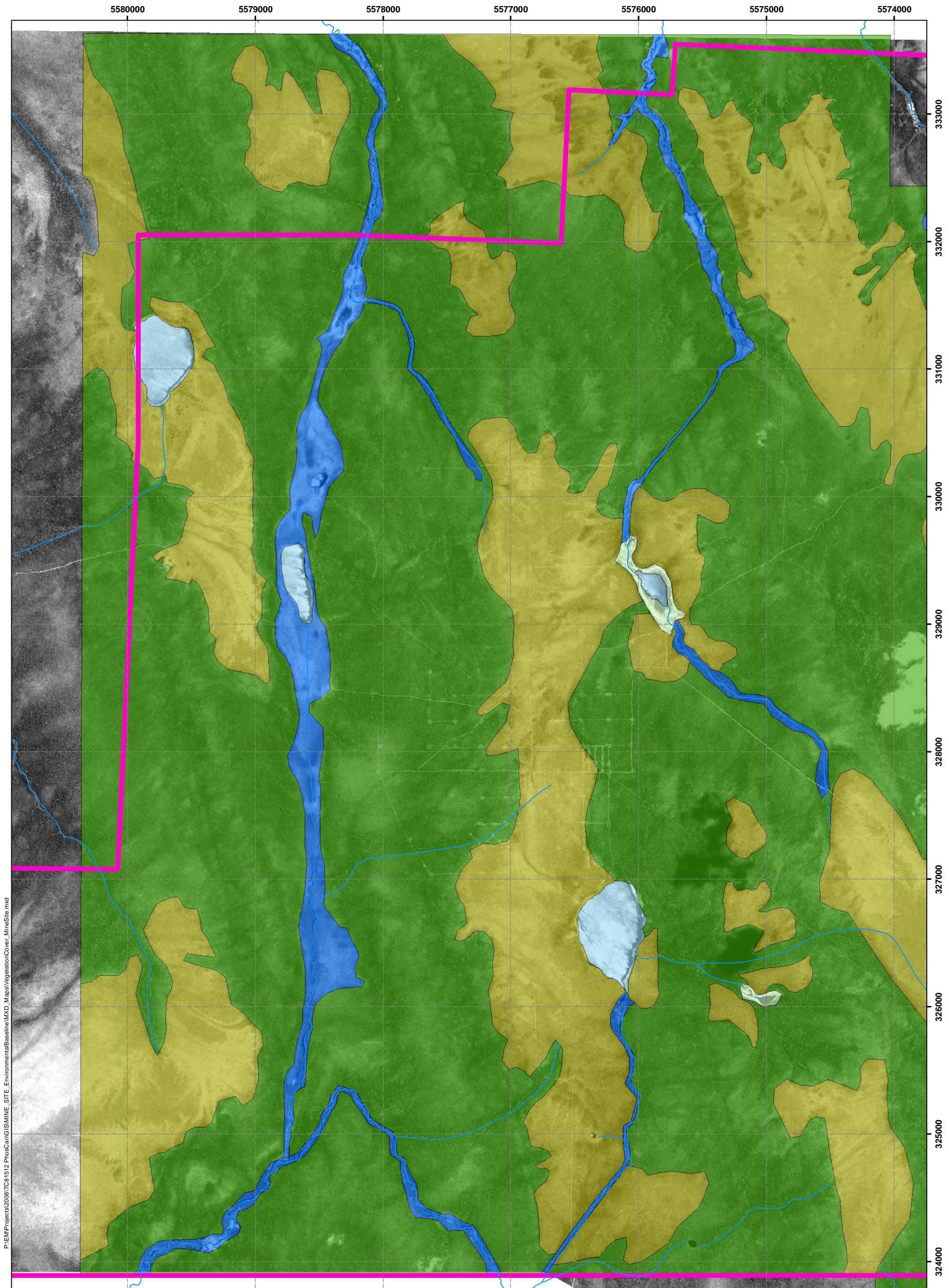
PROJECT No: TC81512

FIGURE: 2-3



Datum: NAD83
 Projection: UTM Zone 17(north)





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LEGEND

Vegetation Cover Category

- Coniferous
- Coniferous Treed Bog
- Herb Wetland
- Shrubby Wetland/Riparian
- Open Water

PhosCan Claim Boundary

NOTES:
- Stream and Waterbody data extracted from Ontario digital geographic database (ODGD- OBM)



MARTISON PHOSPHATE PROJECT

Vegetation Cover at Mine Site

SCALE: 1:28,000

DATE: December 2008

PROJECT No: TC81512

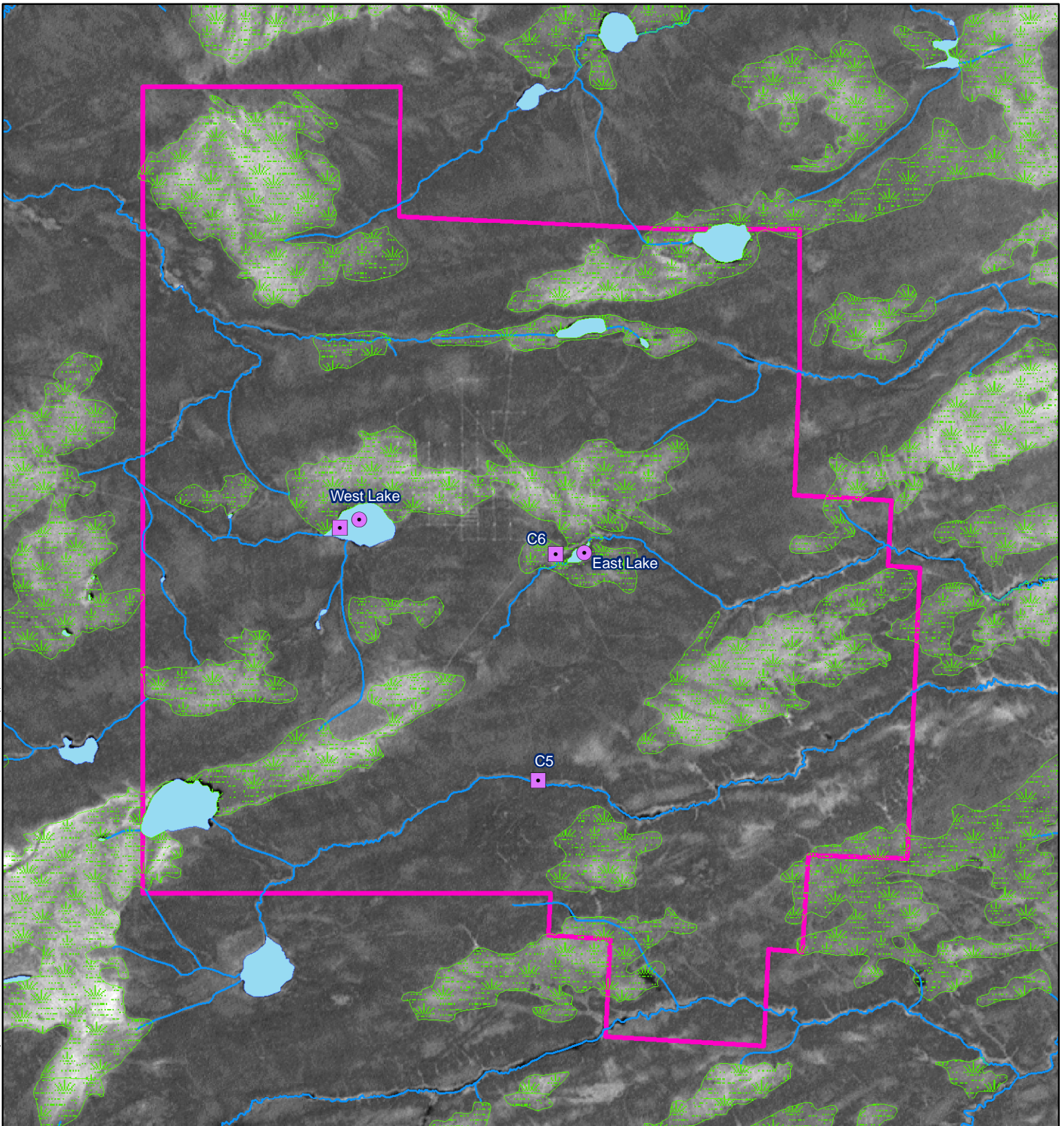
FIGURE: 2-4









Datum: NAD83
Projection: UTM Zone 17(north)



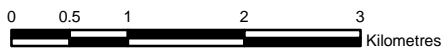
P:\EM\Projects\2008\TC81512 PhosCan\GIS\MINE_SITE_Environment\Baseline\MXD_Maps\Explorer\SiteSampleLocations.mxd



LEGEND

-  Fish/Sediment/Water Sampling Locations (AMEC 2008)
-  Fish Community Sampling Locations (Golder 2007)
-  PhosCan Claim Boundary
-  Wetland
-  Watercourses
-  Waterbody

NOTES:
 ALL LOCATIONS ARE APPROXIMATE
 - Stream, wetland and waterbody extracted from National Topographic Database - Centre for Topographic Information - Natural Resources Canada



Datum: NAD83
 Projection: UTM Zone 17(north)



MARTISON PHOSPHATE PROJECT

Mine Site Sampling Locations

SCALE: 1:65,000




DATE: December 2008

PROJECT No: TC81512

FIGURE: 2-5




LEGEND

-  Beaver Dam
-  Station Boundary
-  Flow Direction




Fish Species Presence

- Fathead Minnow
- Brook Stickleback
- Pearl Dace
- White sucker
- Longnose Sucker
- Creek Chub

	
CONTRACT Martison Phosphate Project Aquatic Ecosystems Existing Conditions Report	
STATION C5 FISHERIES STUDY SITE SUMMARY	
PROJECT NUMBER TC81512	DATE December 2008
VENDOR DWG No Summary C5.cdr	CLIENT DWG No FIGURE 2-6



LEGEND


-  Beaver Dam
-  Station Boundary
-  Flow Direction

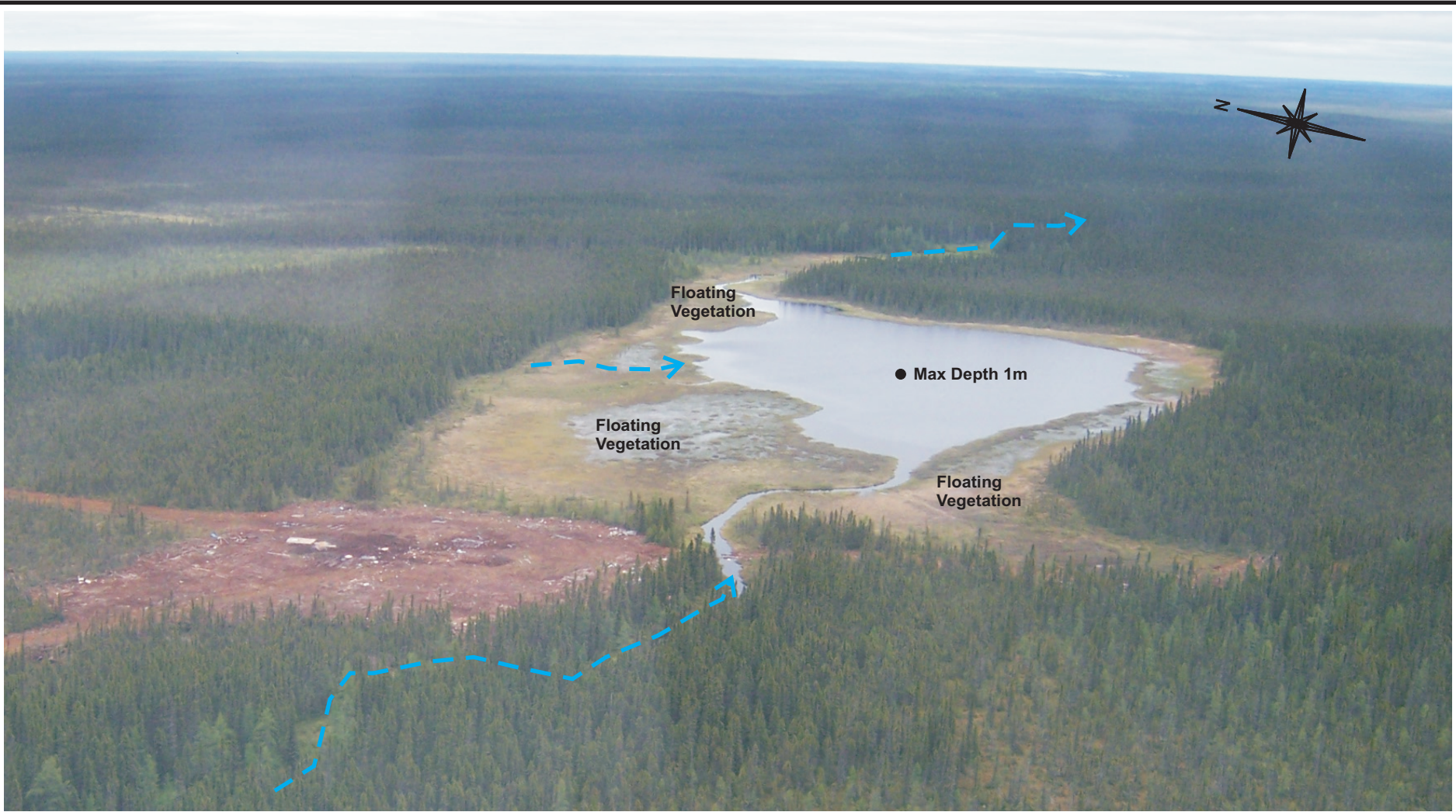
Fish Species Presence

Brook Stickleback




Substrates

muck / detritus

	
CONTRACT Martison Phosphate Project Aquatic Ecosystems Existing Conditions Report	
STATION C6 FISHERIES STUDY SITE SUMMARY	
PROJECT NUMBER TC81512	DATE December 2008
VENDOR DWG No Summary C6.cdr	CLIENT DWG No FIGURE 2-7



LEGEND


-  Beaver Dam
-  Station Boundary
-  Flow Direction

Fish Species Presence

- Finescale Dace
- Pearl Dace
- White sucker
- Brook Stickleback




Substrates

muck / detritus

	
CONTRACT Martison Phosphate Project Aquatic Ecosystems Existing Conditions Report	
EAST LAKE FISHERIES STUDY SITE SUMMARY	
PROJECT NUMBER TC81512	DATE December 2008
VENDOR DWG No Summary East Lake.cdr	CLIENT DWG No FIGURE 2-8



LEGEND

-  Beaver Dam
-  Station Boundary
-  Flow Direction

Fish Species Presence

- Northern Pike
- Yellow Perch

Substrates

- muck / detritus



CONTRACT

Martison Phosphate Project
Aquatic Ecosystems Existing Conditions Report

**WEST LAKE
FISHERIES STUDY SITE SUMMARY**

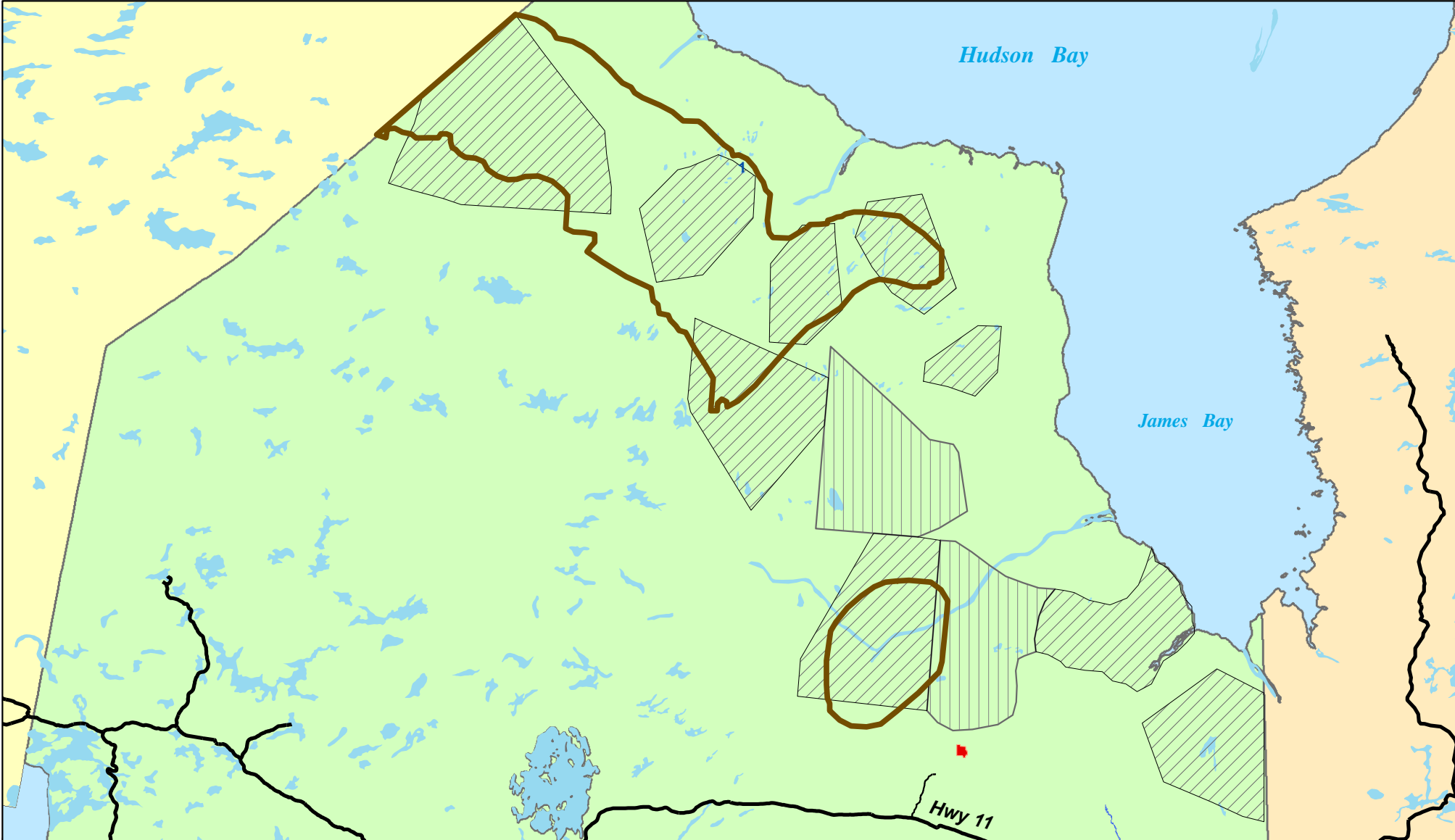
PROJECT NUMBER TC81512 DATE December 2008

VENDOR DWG No
Summary West Lake.cdr









CLIENT DWG No

FIGURE 2-9

P:\EM\Projects\2008\TC81512 PhosCan\GIS\MINE_SITE_Environmental\Baseline\MXD_Maps\CaribouConcentrations\WinteringAreas.mxd



LEGEND

-  High Relative Abundance of Caribou in Winter **
-  Core Wintering Areas used by Caribou **
-  Areas of Varying (Moderate to High) Caribou Abundance
-  Major Roads *
-  Martison Site
-  Ontario *
-  Quebec *
-  Manitoba *

Source:
 * Ontario Base Mapping layers extracted from the Ontario Digital Geographic Database
 ** As found in the article "Distribution and relative abundance of caribou in the Hudson Plains Ecozone of Ontario"



MARTISON PHOSPHATE PROJECT

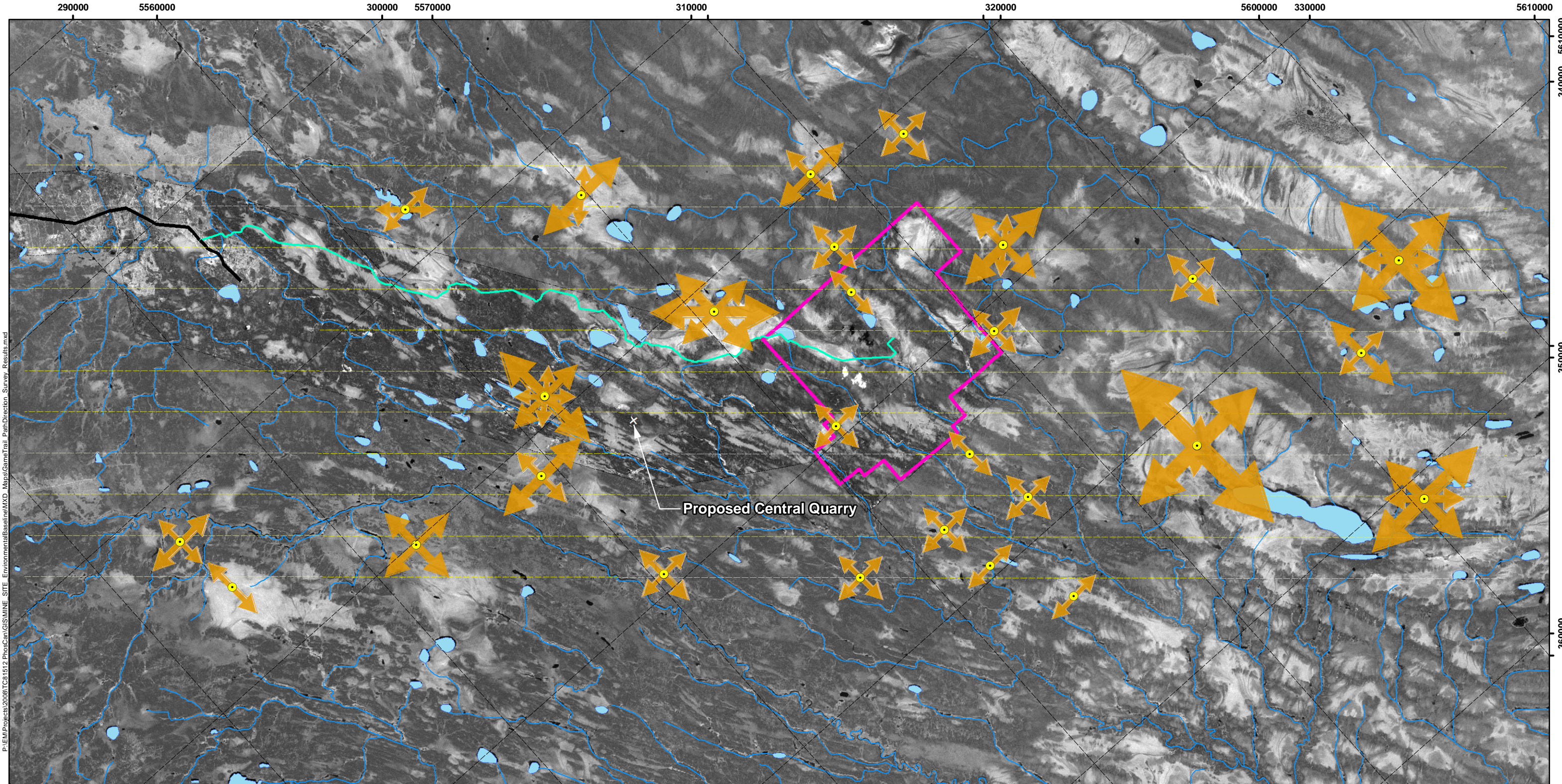
Caribou Concentrations and Wintering Areas (after Magoun et al. 2005)



Datum: NAD83
 Projection: UTM Zone 17(north)



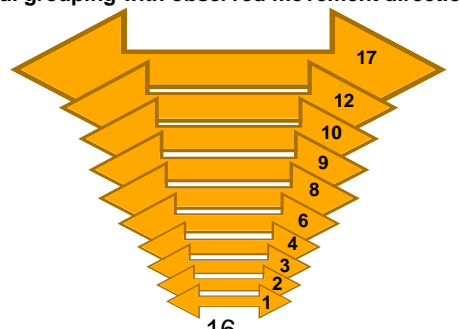
SCALE: 1:5,000,000	DATE: December 2008
PROJECT No: TC81510	FIGURE: 2-10



P:\EMAP\Projects\2008\TC81512 PhosCan\GIS\MINE SITE EnvironmentalBaseline\MXD Maps\GameTrail_PathDirection_Survey_Results.mxd

- LEGEND**
- North-South Trail Direction
 - East-West Trail Direction
 - Northeast-Southwest Trail Direction
 - Northwest-Southeast Trail Direction

Arrow size indicates the number of waypoints within a spatial grouping with observed movement direction evidence. *



- Centroid of Spatial Grouping Minimum Convex Polygon *
- Aerial Survey Flight Lines
- Winter Road
- Fushimi Road
- PhosCan Claim Boundary

* Spatial groupings are based on proximity clusters. Spatial grouping regions are derived from the minimum convex polygon (MCP) of all waypoints in a spatial grouping. The centroid of the MCP regions are used as the direction arrow anchors.

NOTES:
 - Stream and Waterbody data extracted from National Topographic Database - Centre for Topographic Information - Natural Resources Canada
 - LANDSAT 7 (ETM+_panchromatic image downloaded from GeoBase.ca
 - Survey conducted on September 12th and 13th 2008



MARTISON PHOSPHATE PROJECT

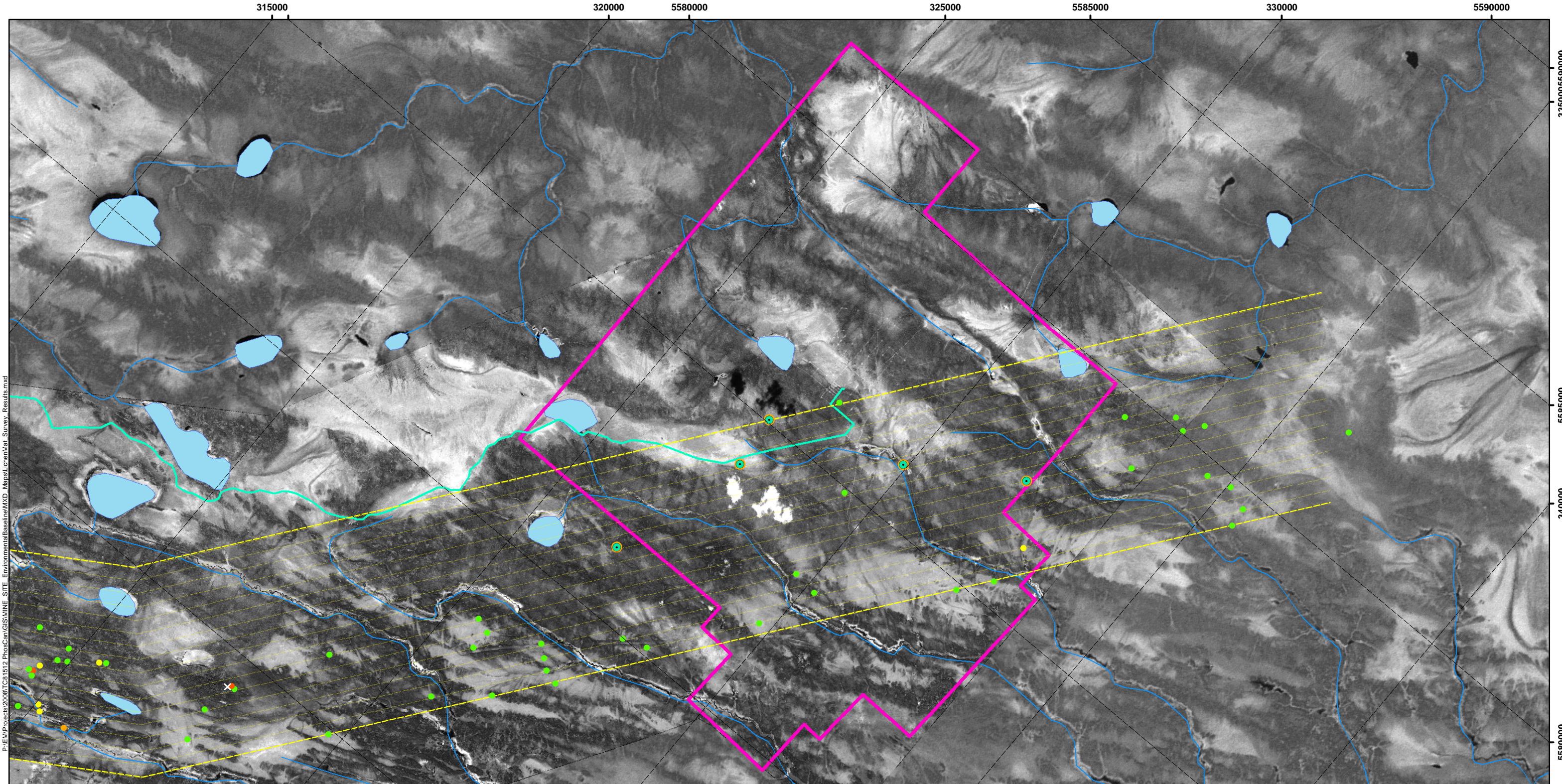
Observed Movement Directions of Game Trails

SCALE: 1:183,000	DATE: December 2008
PROJECT No: TC81512	FIGURE: 2-11



Datum: NAD83
 Projection: UTM Zone 17(north)



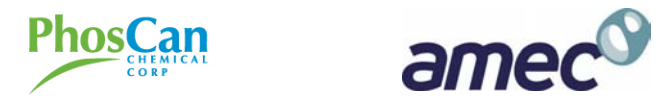


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LEGEND

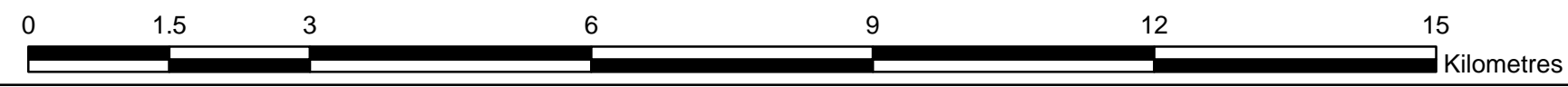
- Lichen Patch Size Rank**
- Patches < 25 m²
 - Patches 25 m² to 50 m²
 - Patches 100 m² to 500 m²
 - Patches > 1000 m²
 - Very small scattered patches on the tops of hummocks
- Aerial Survey Flight Lines
 - Winter Road
 - Fushimi Road
 - PhosCan Claim Boundary

NOTES:
 - Stream and Waterbody data extracted from National Topographic Database - Centre for Topographic Information - Natural Resources Canada
 - LANDSAT 7 (ETM+) Panchromatic image downloaded from GeoBase.ca
 - Survey conducted on September 11, 2008



MARTISON PHOSPHATE PROJECT

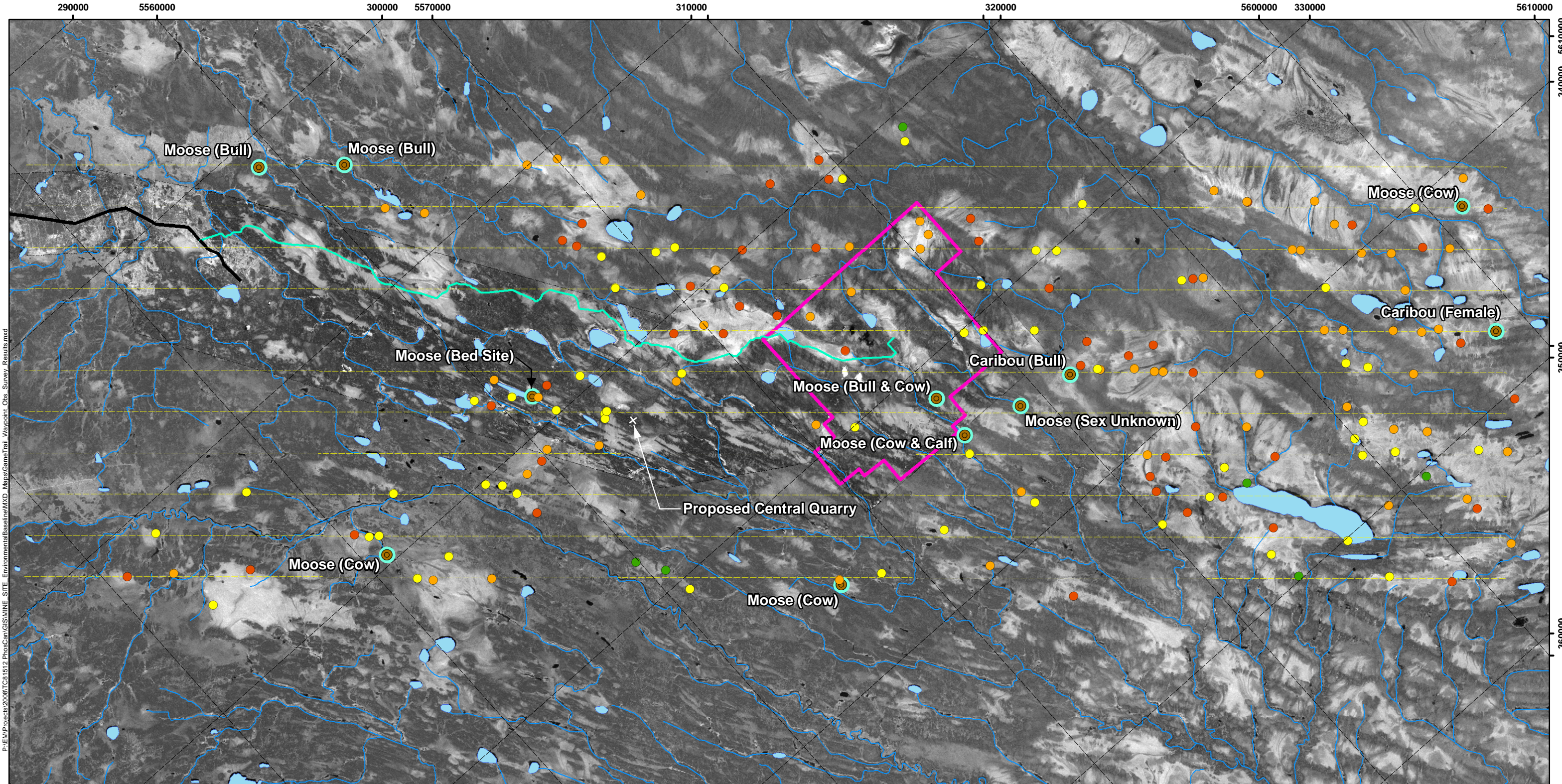
Distribution and Abundance of Lichen Patches



Datum: NAD83
 Projection: UTM Zone 17(north)



SCALE: 1:73,000	DATE: December 2008
PROJECT No: TC81512	FIGURE: 2-12



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LEGEND
Game Trail Observations

Observation Rank

- Small Sized Movement Path (a narrow and not very deep trail)
- Medium Sized Movement Path (slightly wider and deeper than the smallest trails observed)
- Large Sized Movement Path (a single, very prominent trail)
- Large and Numerous Movement Paths (several distinct, very prominent trails in the same area)
- Moose/Caribou Sightings or Evidence (Labeled with description on map)

- Aerial Survey Flight Lines
- Winter Road
- Fushimi Road
- PhosCan Claim Boundary



NOTES:
 - Stream and Waterbody data extracted from National Topographic Database - Centre for Topographic Information - Natural Resources Canada
 - LANDSAT 7 (ETM+ panchromatic image downloaded from GeoBase.ca)
 - Survey conducted on September 12th and 13th 2008



MARTISON PHOSPHATE PROJECT	
Distribution and Abundance of Game Trails, Moose and Caribou	
SCALE: 1:183,000	DATE: December 2008
PROJECT No: TC81512	FIGURE: 2-13

Datum: NAD83
 Projection: UTM Zone 17(north)



3.0 REFERENCES

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APPENDIX A
COMPILED PLANT LIST

**TABLE 3-2
COMPILED PLANT LIST**

Common Name	Scientific Name	Family	Global Rank	Provincial Rank	COSEWIC	COSSARO
Balsam Fir	<i>Abies balsamea</i>	Pinaceae	G5	S5		
Red Maple	<i>Acer rubrum</i>	Aceraceae	G5	S5		
Mountain Maple	<i>Acer spicatum</i>	Aceraceae	G5	S5		
Common Yarrow	<i>Achillea millefolium</i>	Asteraceae	G5T?	SE		
Red Baneberry	<i>Actaea rubra</i>	Ranunculaceae	G5	S5		
Rough Bentgrass	<i>Agrostis scabra</i>	Poaceae	G5	S5		
Northern Water-plantain	<i>Alisma triviale</i>	Alismataceae	G5	S5		
Speckled Alder	<i>Alnus incana</i>	Betulaceae	G5	S5		
Green Alder	<i>Alnus viridis</i>	Betulaceae	G5	S5		
Saskatoon Serviceberry	<i>Amelanchier alnifolia</i>	Rosaceae	G5	S4?		
Pearly Everlasting	<i>Anaphalis margaritacea</i>	Asteraceae	G5	S5		
Bog Rosemary	<i>Andromeda polifolia</i>	Ericaceae	G5T5	S4		
Canada Anemone	<i>Anemone canadensis</i>	Ranunculaceae	G5	S5		
Wood Anemone	<i>Anemone quinquefolia</i>	Ranunculaceae	G5	S5		
Spreading Dogbane	<i>Apocynum androsaemifolium</i>	Apocynaceae	G5	S5		
Wild Sarsaparilla	<i>Aralia nudicaulis</i>	Araliaceae	G5	S5		
Swamp-pink	<i>Arethusa bulbosa</i>	Orchidaceae	G4	S4		
Paper Birch	<i>Betula papyrifera</i>	Betulaceae	G5	S5		
Swamp Birch	<i>Betula pumila</i>	Betulaceae	G5	S5		
Rattlesnake Fern	<i>Botrychium virginianum</i>	Ophioglossaceae	G5	S5		
Canada Bluejoint	<i>Calamagrostis canadensis</i>	Poaceae	G5	S5		
Water Calla	<i>Calla palustris</i>	Araceae	G5	S5		
Marsh Marigold	<i>Caltha palustris</i>	Ranunculaceae	G5	S5		
Pennsylvania Bitter-cress	<i>Cardamine pensylvanica</i>	Brassicaceae	G5	S5		
Water Sedge	<i>Carex aquatilis</i>	Cyperaceae	G5	S5		
Softleaf Sedge	<i>Carex disperma</i>	Cyperaceae	G5	S5		
Coast Sedge	<i>Carex exilis</i>	Cyperaceae	G5	S5		
Lake-bank Sedge	<i>Carex lacustris</i>	Cyperaceae	G5	S5		
Slender Sedge	<i>Carex lasiocarpa</i>	Cyperaceae	G5	S5		
Mud Sedge	<i>Carex limosa</i>	Cyperaceae	G5	S5		
Livid Sedge	<i>Carex livida</i>	Cyperaceae	G5	S5		
Boreal Bog Sedge	<i>Carex magellanica</i>	Cyperaceae	G5	S5		
Few-seeded Sedge	<i>Carex oligosperma</i>	Cyperaceae	G4	S4		
Pointed Broom Sedge	<i>Carex scoparia</i>	Cyperaceae	G5	S5		
Tussock Sedge	<i>Carex stricta</i>	Cyperaceae	G5	S5		
Sparse-flowered Sedge	<i>Carex tenuiflora</i>	Cyperaceae	G5	S5		
Beaked Sedge	<i>Carex utriculata</i>	Cyperaceae	G5	S5		
Sedge sp.	<i>Carex sp.</i>	Cyperaceae				

Fire Moss	<i>Ceratodon purpureus</i>	Ditrichaceae	G5	S5	
Leatherleaf	<i>Chamaedaphne calyculata</i>	Ericaceae	G5	S5	
Oxeye Daisy	<i>Chrysanthemum leucanthemum</i>	Asteraceae	G?	SE5	
Bulb-bearing Water-hemlock	<i>Cicuta bulbifera</i>	Apiaceae	G5	S5	
Swamp Thistle	<i>Cirsium muticum</i>	Asteraceae	G5	S5	
Reindeer Lichen	<i>Cladina rangiferina</i>	Cladoniaceae	G5	S5?	
Coral Lichen	<i>Cladina stellaris</i>	Cladoniaceae	G5	S4?	
False Pixie Cups	<i>Cladonia chlorophaea</i>	Cladoniaceae	GU	S5	
British Soldiers	<i>Cladonia cristatella</i>	Cladoniaceae	G5?	S5	
Blue Bead Lily	<i>Clintonia borealis</i>	Liliaceae	G5	S5	
Goldthread	<i>Coptis trifolia</i>	Ranunculaceae	G5	S5	
Striped Coralroot	<i>Corallorhiza striata</i>	Orchidaceae	G5	S4	
Bunchberry	<i>Cornus canadensis</i>	Cornaceae	G5	S5	
Roundleaf Dogwood	<i>Cornus rugosa</i>	Cornaceae	G5	S5	
Red-osier Dogwood	<i>Cornus stolonifera</i>	Cornaceae	G5	S5	
Yellow Corydalis	<i>Corydalis flavula</i>	Fumariaceae	G5	S2	
Pale Corydalis	<i>Corydalis sempervirens</i>	Fumariaceae	G4G5	S5	
Beaked Hazelnut	<i>Corylus cornuta</i>	Betulaceae	G5	S5	
Small Yellow Lady's-Slipper	<i>Cypripedium parviflorum</i> <i>ssp. Makasin</i>	Orchidaceae	G5T3T5Q	S4S5	
Northern Bush Honeysuckle	<i>Diervilla lonicera</i>	Caprifoliaceae	G5	S5	
Fan Clubmoss	<i>Diphasiastrum digitatum</i>	Lycopodiaceae	G5	S5	
Sundew sp.	<i>Drosera sp.</i>	Droseraceae			
Creeping Spike-rush	<i>Eleocharis smallii</i>	Cyperaceae	G5?	S5	
Fireweed	<i>Epilobium angustifolium</i>	Onagraceae	G5	S5	
Field Horsetail	<i>Equisetum arvense</i>	Equisetaceae	G5	S5	
Water Horsetail	<i>Equisetum fluviatile</i>	Equisetaceae	G5	S5	
Meadow Horsetail	<i>Equisetum pratense</i>	Equisetaceae	G5	S5	
Dwarf Scouring Rush	<i>Equisetum scirpoides</i>	Equisetaceae	G5	S5	
Woodland Horsetail	<i>Equisetum sylvaticum</i>	Equisetaceae	G5	S5	
Variiegated Horsetail	<i>Equisetum variegatum</i>	Equisetaceae	G5	S5	
Slender Cottongrass	<i>Eriophorum gracile</i>	Cyperaceae	G5	S5	
Tussock Cottongrass	<i>Eriophorum vaginatum</i>	Cyperaceae	G5	S5	
Green-keeled Cottongrass	<i>Eriophorum viridi-carinatum</i>	Cyperaceae	G5	S5	
Cottongrass sp.	<i>Eriophorum sp.</i>	Cyperaceae			
Spotted Joe-Pye-Weed	<i>Eupatorium maculatum</i>	Asteraceae	G5T?	S5	
Large-leaf Wood-Aster	<i>Eurybia macrophylla</i>	Asteraceae	G5	S5	
Woodland Strawberry	<i>Fragaria vesca</i>	Rosaceae	G5	S5	
Virginia Strawberry	<i>Fragaria virginiana</i>	Rosaceae	G5	S5	
Rough Bedstraw	<i>Galium asprellum</i>	Rubiaceae	G5	S5	
Northern Bedstraw	<i>Galium boreale</i>	Rubiaceae	G5	S5	
Bog Bedstraw	<i>Galium labradoricum</i>	Rubiaceae	G5	S5	
Creeping Snowberry	<i>Gaultheria hispidula</i>	Ericaceae	G5	S5	

Bicknell Northern Crane's-bill	<i>Geranium bicknellii</i>	Geraniaceae	G5	S4		
Purple Avens	<i>Geum rivale</i>	Rosaceae	G5	S5		
Oak Fern	<i>Gymnocarpium dryopteris</i>	Dryopteridaceae	G5	S5		
Orange Hawkweed	<i>Hieracium aurantiacum</i>	Asteraceae	G?	SE5		
Meadow Hawkweed	<i>Hieracium caespitosum</i>	Asteraceae	G?	SE5		
Stair-step Moss	<i>Hylocomium splendens</i>	Hylocomiaceae	G5	S5		
Spotted Jewel-weed	<i>Impatiens capensis</i>	Balsaminaceae	G5	S5		
Blueflag	<i>Iris versicolor</i>	Iridaceae	G5	S5		
Eastern Red Cedar	<i>Juniperus virginiana</i>	Cupressaceae	G5	S5		
Sheep Laurel	<i>Kalmia angustifolia</i>	Ericaceae	G5	S5		
Pale Laurel	<i>Kalmia polifolia</i>	Ericaceae	G5	S5		
Canada Lettuce	<i>Lactuca canadensis</i>	Asteraceae	G5	S5		
American Larch	<i>Larix laricina</i>	Pinaceae	G5	S5		
Pale Vetchling Peavine	<i>Lathyrus ochroleucus</i>	Fabaceae	G4G5	S4		
Labrador Tea	<i>Ledum groenlandicum</i>	Ericaceae	G5	S5		
Lesser Duckweed	<i>Lemna minor</i>	Lemnaceae	G5	S5		
Twinflower	<i>Linnaea borealis</i>	Caprifoliaceae	G5	S5		
American Fly Honeysuckle	<i>Lonicera canadensis</i>	Caprifoliaceae	G5	S5		
Hairy Honeysuckle	<i>Lonicera hirsute</i>	Caprifoliaceae	G4G5	S5		
Swamp Fly Honeysuckle	<i>Lonicera oblongifolia</i>	Caprifoliaceae	G4	S4S5		
Mountain Fly Honeysuckle	<i>Lonicera villosa</i>	Caprifoliaceae	G5	S5		
Bird's-foot Trefoil	<i>Lotus corniculatus</i>	Fabaceae	G?	SE5		
Stiff Clubmoss	<i>Lycopodium annotinum</i>	Lycopodiaceae	G5	S5		
Tree Clubmoss	<i>Lycopodium obscurum</i>	Lycopodiaceae	G5	S4		
American Bugleweed	<i>Lycopus americanus</i>	Lamiaceae	G5	S5		
Wild-lily-of-the-valley	<i>Maianthemum canadense</i>	Liliaceae	G5	S5		
Three-leaf Solomon's-seal	<i>Maianthemum trifolium</i>	Liliaceae	G5	S5		
Ostrich Fern	<i>Matteuccia struthiopteris</i>	Dryopteridaceae	G5	S5		
Black Medic	<i>Medicago lupulina</i>	Fabaceae	G?	SE5		
Corn Mint	<i>Mentha arvensis</i>	Lamiaceae	G5	S5		
Bog Buckbean	<i>Menyanthes trifoliata</i>	Menyanthaceae	G5	S5		
Tall Bluebells	<i>Mertensia paniculata</i>	Boraginaceae	G5	S5		
Naked Bishop's-cap	<i>Mitella nuda</i>	Saxifragaceae	G5	S5		
Sweet Bayberry	<i>Myrica gale</i>	Myricaceae	G5	S5		
Yellow Cowliily	<i>Nuphar variegata</i>	Nymphaeaceae	G5T5	S5		
Spotted Dog Lichen	<i>Peltigera aphthosa</i>	Peltigeraceae	G4G5	S?		
Sweet Coltsfoot	<i>Petasites frigidus</i>	Asteraceae	G5	S5		
Broad Beech Fern	<i>Phegopteris hexagonoptera</i>	Thelypteridaceae	G5	S3	Special Concern (Schedule 3)	Special Concern
Meadow Timothy	<i>Phleum pratense</i>	Poaceae	G?	SE5		
White Spruce	<i>Picea glauca</i>	Pinaceae	G5	S5		
Black Spruce	<i>Picea mariana</i>	Pinaceae	G5	S5		
Schreber's Moss	<i>Pleurozium schreberi</i>	Entodontaceae	G5	S5		

Grass sp.	<i>Poa sp.</i>	Poaceae			
Balsam Poplar	<i>Populus balsamifera</i>	Salicaceae	G5	S5	
Trembling Aspen	<i>Populus tremuloides</i>	Salicaceae	G5	S5	
Marsh Cinquefoil	<i>Potentilla palustris</i>	Rosaceae	G5	S5	
Pin Cherry	<i>Prunus pensylvanica</i>	Rosaceae	G5	S5	
Choke Cherry	<i>Prunus virginiana</i>	Rosaceae	G5	S5	
Bracken Fern	<i>Pteridium aquilinum</i>	Dennstaedtiaceae	G5	S5	
American Wintergreen	<i>Pyrola americana</i>	Pyrolaceae	G5	S4?	
Pink Wintergreen	<i>Pyrola asarifolia</i>	Pyrolaceae	G5	S5	
Pyrola sp.	<i>Pyrola sp.</i>	Pyrolaceae			
Kidney-leaved Buttercup	<i>Ranunculus abortivus</i>	Ranunculaceae	G5	S5	
Tall Buttercup	<i>Ranunculus acris</i>	Ranunculaceae	G5	SE5	
Yellow Water-crowfoot	<i>Ranunculus flabellaris</i>	Ranunculaceae	G5	S4?	
Bristly Buttercup	<i>Ranunculus hispidus</i>	Ranunculaceae	G5T5	S3	
Alderleaf Buckthorn	<i>Rhamnus alnifolia</i>	Rhamnaceae	G5	S5	
Yellow Rattle	<i>Rhinanthus minor</i>	Scrophulariaceae	G5T?	SE5	
Prickly Gooseberry	<i>Ribes cynosbati</i>	Grossulariaceae	G5	S5	
Skunk Currant	<i>Ribes glandulosum</i>	Grossulariaceae	G5	S5	
Smooth Gooseberry	<i>Ribes hirtellum</i>	Grossulariaceae	G5	S5	
Northern Gooseberry	<i>Ribes oxycanthoides</i>	Grossulariaceae	G5	S5	
Prickly Rose	<i>Rosa acicularis</i>	Rosaceae	G5	S5	
Smooth Rose	<i>Rosa blanda</i>	Rosaceae	G5	S5	
Cloudberry	<i>Rubus chamaemorus</i>	Rosaceae	G5	S5	
Common Red Raspberry	<i>Rubus idaeus</i> <i>ssp. Melanolasius</i>	Rosaceae	G5T5	S5	
Dwarf Raspberry	<i>Rubus pubescens</i>	Rosaceae	G5	S5	
Bebb's Willow	<i>Salix bebbiana</i>	Salicaceae	G5	S5	
Pussy Willow	<i>Salix discolor</i>	Salicaceae	G5	S5	
Sandbar Willow	<i>Salix exigua</i>	Salicaceae	G5	S5	
Shining Willow	<i>Salix lucida</i>	Salicaceae	G5	S5	
Bog Willow	<i>Salix pedicellaris</i>	Salicaceae	G5	S5	
Balsam Willow	<i>Salix pyrifolia</i>	Salicaceae	G5	S5	
Willow sp.	<i>Salix sp.</i>	Salicaceae			
European Red Elder	<i>Sambucus racemosa</i>	Caprifoliaceae	G5	S5	
Northern Pitcher-plant	<i>Sarracenia purpurea</i>	Sarraceniaceae	G5	S5	
Three-square	<i>Schoenoplectus pungens</i>	Cyperaceae	G5	S5	
Cottongrass Bulrush	<i>Scirpus cyperinus</i>	Cyperaceae	G5	S5	
Strict Blue-eyed Grass	<i>Sisyrinchium montanum</i>	Iridaceae	G5	S5	
Hemlock Water-parsnip	<i>Sium suave</i>	Apiaceae	G5	S5	
Canada Goldenrod	<i>Solidago canadensis</i>	Asteraceae	G5T5	S5	
Northern Mountain-ash	<i>Sorbus decora</i>	Rosaceae	G4G5	S5	
Sphagnum Moss	<i>Sphagnum sp.</i>	Sphagnaceae			
Narrow-leaved Meadow-sweet	<i>Spiraea alba</i>	Rosaceae	G5	S5	

Rose Twisted Stock	<i>Streptopus lanceolatus</i>	Liliaceae	G5	S5		
Snowberry	<i>Symphoricarpos albus</i>	Caprifoliaceae	G5T4	S4S5		
Brown-seed Dandelion	<i>Taraxacum officinale</i>	Asteraceae	G5	SE5		
Canadian Yew	<i>Taxus canadensis</i>	Taxaceae	G5	S4		
Tall Meadow-rue	<i>Thalictrum pubescens</i>	Ranunculaceae	G5	S5		
Marsh Fern	<i>Thelypteris palustris</i>	Thelypteridaceae	G5	S5		
Eastern White Cedar	<i>Thuja occidentalis</i>	Cupressaceae	G5	S5		
Sticky False Asphodel	<i>Tofieldia glutinosa</i>	Liliaceae				
Alpine Leafless-bulrush	<i>Trichophorum alpinum</i>	Cyperaceae	G5	S5		
Tufted Leafless-bulrush	<i>Trichophorum caespitosum</i>	Cyperaceae	G5	S5		
Northern Starflower	<i>Trientalis borealis</i>	Primulaceae	G5	S5		
Red Clover	<i>Trifolium pratense</i>	Fabaceae	G?	SE5		
White Clover	<i>Trifolium repens</i>	Fabaceae	G?	SE5		
Common Bog Arrowgrass	<i>Triglochin maritimum</i>	Juncaginaceae	G5	S5		
Nodding Trillium	<i>Trillium cernuum</i>	Liliaceae	G5	S5		
Coffee Tinker's-weed	<i>Triosteum aurantiacum</i>	Caprifoliaceae	G5	S5		
Colt's Foot	<i>Tussilago farfara</i>	Asteraceae	G?	SE5		
Narrow-leaved Cattail	<i>Typha angustifolia</i>	Typhaceae	G5	SE5		
Old Man's Beard sp.	<i>Usnea sp.</i>	Parmeliaceae				
Flatleaf Bladderwort	<i>Utricularia intermedia</i>	Lentibulariaceae	G5	S5		
Late Lowbush Blueberry	<i>Vaccinium angustifolium</i>	Ericaceae	G5	S5		
Velvetleaf Blueberry	<i>Vaccinium myrtilloides</i>	Ericaceae	G5	S5		
Small Cranberry	<i>Vaccinium oxycoccos</i>	Ericaceae	G5	S5		
American Speedwell	<i>Veronica americana</i>	Scrophulariaceae	G5	S5		
Squashberry	<i>Viburnum edule</i>	Caprifoliaceae	G5	S5		
Highbush Cranberry	<i>Viburnum trilobum</i>	Caprifoliaceae	G5T5	S5		
Tufted Vetch	<i>Vicia cracca</i>	Fabaceae	G?	SE5		
Kidney-leaf White Violet	<i>Viola renifolia</i>	Violaceae	G5	S5		

GU Global Status Uncertain
G? Globally Unranked Species
G4 Globally Common Species
G5 Globally Very Common Species

S2 Provincially Imperiled Species
S3 Provincially Vulnerable Species
S4 Provincially Apparently Secure Species
S5 Provincially Secure Species
SE5 Provincially Exotic Secure Species

APPENDIX B

PROVINCIALY - SPECIES AT RISK

SPECIES AT RISK POTENTIALLY LOCATED IN STUDY AREA

Species	SARA Rank	SARO Rank	Habitat	Potential	Rationale	Project Areas with Appropriate Habitat
Woodland Caribou	Threatened, Schedule 1	Threatened	In winter, caribou use mature and old-growth coniferous forests that contain large quantities of terrestrial and arboreal (tree-inhabiting) lichens. These forests are generally associated with upland mesic sites and small drainages. In summer, caribou occasionally feed in young stands, after fire or logging.	High	The potential for their occurrence within the Project area is high. There is one known over-wintering ground within 45 km of the site (Figure 4.2). Groups of caribou have been documented within approximately 25 km of the site, both to the west in the 1990's and to the east in 2006.	The mine site has mature black spruce forest. However due to extreme wetness of the area, habitats with abundant lichen are not common.
Wolverine	Special Concern	Threatened	Requires large wilderness areas. Inhabits a variety of treed and treeless areas at all elevations. This species may be abundant where large ungulates are common.	Low	There is suitable habitat for wolverine within the Project area, however the occurrence of this species is listed as low as the Project is located outside of the area indicated on the Species at Risk range map and it was not identified by local trappers (William Chee Choo pers comm. 2008) as occurring in the Project area. NHIC does not have records of wolverine in the vicinity of this site, although it is believed by MNR that their current range may be expanding eastward.	The mine site has mature black spruce forest, thus is potential wolverine habitat.
Monarch Butterfly	Special Concern, Schedule 1	Not at Risk	Found wherever there are milkweed plants for its caterpillars and wildflowers for its nectar source. Often found in old field meadow habitat types.	Low	There is no suitable habitat available for this species within the Project area.	
Golden Eagle	Not at Risk	Endangered	Cliff walls.	Low	The typical nesting habitat for this species of cliff walls does not occur within the Project area. The Project is located at the very southern edge of this species range. No records in NHIC for the Hearst District.	No polygons with cliffs, birds may fly through the Project area.

Black Tern	Not at Risk	Special Concern	Freshwater marshes and wet meadows.	Moderate	There are breeding bird records for this species within 100 km of the site. There is suitable breeding habitat for this species on site. No breeding records in NHIC, but recent OBBA indicates possible breeding evidence in the vicinity of the Project area.	Most wetlands in the Project area are suitable for nesting by Black Terns.
Bald Eagle	Not at Risk	Special Concern (north of the French River)	Large trees near open water. Requires tall, dead, partially dead or living trees near the nest for perching.	Moderate	There were mixed forests containing large deciduous trees along the ridges within the Project area. Species information provided by the NHIC indicates 3 known BAEA nests within 40 km of the road, but nothing immediate. There seem to be a number of locations in the OBBA as well.	The mature mixed-wood ridges through out the region may provide suitable nesting habitat for this species.