Annex VI

Access Roads and Connection Line Summary

Contents

1. Power Lines and Road Summary for Wabagishik Rapids Hydroelectric Project (Vermillion River)- *KBM Resource Group*
2. Site Access and Powerline Route Index Map- Tile Set G1, Tile G3, Tile G4 (Vermillion River) Wabagishik Rapids- *KBM Resources Group*

Power Line and Road Summary for Wabagishik Rapids Hydroelectric Project (Vermillion River)

A Summary Report for:

Xeneca Power Development Inc.

July 18, 2013

KBM RESOURCES GROUP

349 Mooney Avenue
Thunder Bay, Ontario
P7B 5L5

Table of Contents

Table of Tables

Table of Figures

Power Line and Access Road Route Investigation, Analysis and Verification

KBM Resources Group was retained by Xeneca Power Development Inc. (Xeneca) to undertake a route investigation of proposed power line and access road routes for 18 proposed hydroelectric projects. The 18 proposed Xeneca projects have been awarded conditional approval by the Ontario Power Authority under the Feed in Tariff (FIT) program. For each project, the site of the generator, point of common coupling (PCC) and point of connection (PC) are identified in the conditionally approved FIT application. Based on these approved points of connection, this exercise was undertaken to refine power line routes for each project. KBM was later asked to include discussion of considerations as the power line and road access routes evolved over time to consider two options.

The Wabagishik Project is located approximately 11.3 km east of the town of Espanola on the Vermillion River and has a proposed generating capacity of 3.4 MW.

This report is a project-specific report that describes the process used to refine power line routes and road access routes for the Wabagishik project. The report includes documentation of inputs to route iterations, analyses that were conducted, input that was gathered, and assessments that were carried out. The report is comprised of a detailed description of the methodology used to locate and assess and compare the power line and road options.

Assessment Framework for Power Lines and Roads

This report provides details of the assessment work that was carried out for power lines and new access roads. The assessment work has been combined into one report due to the similarities in the work conducted on each of these types of corridors. There is a significant difference, however, in the legislative framework used to evaluate each type of corridor.

Power lines rated less than 115 kV are not subject to the Waterpower Class EA or to MNR Class EAs. Instead, any potential impacts of lines will be examined by MNR as part of the land disposition process using a decision-making framework that is summarized below. As such, the information on power lines provided in this report is for information purposes only and should not be considered within the scope of the EA.

New access roads that are constructed as part of waterpower projects are covered within the scope of the Class EA for Waterpower Projects. The access road information provided in this report should therefore be considered a component of the Class EA for the project.

MNR's Decision Making Framework

The following are the steps that the MNR will be carrying out as part of the decision making process prior to disposition of land for the proposed power lines. Results of the work referenced in this report are intended to help support MNR's decisions.

1. Screening Process
    a. Prepare the project description
    b. Apply screening criteria
        i. Include mitigation measures
        ii. Assign high, medium and low effects in the screening process
    c. Determine the disposition's potential environmental effects (nil/low or moderate/high)
2. Projects with moderate to high potential net environmental effects also require:
    a. Public notice
    b. Project evaluation (technical aspects)
3. Mitigation
4. Monitoring of project

Methodology: Detailed Line Location and Assessment

KBM was provided with preliminary power line routings developed by Xeneca staff and mapped by Natural Resource Solutions Inc in 2010. These preliminary routes were created based on data found on publicly available mapping websites such as Google maps, Google Earth and Land Information Ontario (LIO) data sets (water, roads, streams, etc). (Detailed information about values and land tenure affected by the proposed power lines was not available during this phase).

KBM extended the scope of the 2010 review to further optimize the routes by maximizing the use of existing resources (roads), minimizing the number of water crossings, and avoiding wetlands where possible.

Draft Report on Proposed Power Lines and Access Roads

Further review of the attributes of the proposed route was undertaken by KBM. KBM began assembling a database of pertinent values information and land tenure designations for the proposed power line routes. The proposed line locations were then overlaid with assembled values layers, and a summary of the potentially impacted values was compiled and summarized. The analysis focused on impacted values within proximity of 2km of the proposed power line which included moose calving sites, aquatic resource areas, fish spawning zones, natural heritage areas and bird nesting sites. Data layers used for this exercise included:

- Land Information Ontario dataset
- NRCan Topographic data
- 2008 Forest Resource Inventory data
- Medium resolution SPOT panchromatic orthoimagery from Natural Resources Canada
- NRVIS Data Layers (circa Feb 2011)

A linear breakdown of proposed lines following existing roads, new access roads and new line corridors was also compiled and summarized. Minor amendments were made to the proposed routes by aligning them with existing roads and by avoiding water crossings and other sensitive areas to minimize potential impacts to the environment.

At this time, where appropriate, additional line route options were proposed. These were presented and explained in the draft report as alternatives with a primary goal of following existing roads and reducing impact to sensitive areas and identified values.

A draft report summarizing the above desktop exercise was completed in March, 2011. This report was distributed by Xeneca/KBM to all of the involved government agencies with the primary purpose of soliciting feedback on the identified (and quantified) proposed lines to determine if sensitive values were missed during the preliminary analysis.

Revised Power Line and Access Road Report

Following submission of the draft report in March, 2011, a high resolution leaf-off aerial photography program was undertaken for all route options. This resulted in 20 cm resolution, digital, true color ortho-photography to aid in habitat characterization and the identification of important environmental values.

KBM also undertook extensive consultation with the SFL holders linked to the 18 projects. The consultation was constructive and most of the SFL holders provided GIS datasets including all road networks, planned harvest block locations and aggregate pit locations. Many of the managing foresters were able to provide location-specific information based on their extensive knowledge of the land base. This information was used to complete further improvements/revisions to the power line routes and roads and was presented in a revised report in July, 2011.

Ground-truthing of the proposed power line and road access routes was completed subsequent to the post processing of digital aerial photography in June 2011. Existing roads and water crossings were assessed to determine their current condition, structural integrity and upgrade requirements, including:

- Current condition and classification (Primary, Secondary & Tertiary) of existing forestry access roads.
- Current condition of existing water crossing structures and drainage culverts.
- Requirements for upgrade; Water crossing structures, road surface, road base, drainage culverts & ditching, road slope reduction.
- General classification of pre-existing road base and aggregate quality and quantity.
- Location of existing aggregate pits in proximity to the project site.

Further revised reports for power line and access routes were completed in November, 2011 for inclusion in the draft EA for each site. Power line and road access routes presented in the revised reports were designed to:

- avoid impacts on known values;
- reduce environmental impact (i.e. streams & wetland crossings);
- minimize landscape footprint and fragmentation;
- dovetail with existing road corridors; and
- reduce total line length.

Road access strategies for all sites focused on the use of existing SFL roads and trails for the majority of project access. Where required, small sections of new road were adjusted to avoid impacts, and were located using high resolution imagery and best available data, including current FMP information. Road routes were reviewed during the ground-truthing exercise in June and July, 2011.

Rapid Assessment (RAT) of potential PSWs*

Where power line or new road corridors could impact adjacent wetlands, a Rapid Assessment Technique was used to determine if the wetland is likely to be scored as a Provincially Significant Wetland (PSW).

Northern Bioscience completed this modeling exercise based on methods outlined in NEST Technical Report TR-025, Wetlands Evaluation in Ontario: Models for Predicting Wetland Score (OMNR, 1995). Where potential PSWs were identified in proximity to a route, the corridor has been realigned with sufficient setback to avoid impacts to these features.

Coarse Filter Assessment – to Avoid Known District-Specific Values

Prior to detailed assessments for significant wildlife habitat, in the fall of 2012, Xeneca provided the MNR with maps of the most recent preferred new power line and access road options, buffered to a 100m corridor width. The MNR then assessed the proposed road and line locations to identify any conflicts with existing district-specific values including:

- Moose Emphasis Areas
- Marten Core Areas (from Forest Management Plans)
- Quality Fishing Zones
- Moose Wintering Habitat
- Significant wetlands
- SAR observations
- Natural Lake Trout Lakes
- Tourism values (including remote operations)
- Locally known sensitive cultural heritage or archaeological values
- Current or historic landfill or waste disposal sites
- Any known natural hazard areas or other liabilities
- Any areas that are subject to land claim negotiations or other known Aboriginal interests
- Any areas subject to pending dispositions (aggregate permits, forestry roads, etc.)
- Areas covered by mining tenure under the Mining Act.
- Land use policy areas that restrict or influence such development (e.g. parks and conservation

reserves)
- Private land
- Federal land
- Existing Crown tenure (leases, LUPs, easements)
- Aggregate license areas, including "greenfield" sites under a first right of refusal (MTO)
- Trap cabins
- Existing utility lines and communications towers
- OFSC snowmobile trail network

Identified conflicts were then assessed by Xeneca and roads and lines were either re-located accordingly to avoid known values and/or mitigation measures were identified and documented to ensure minimal impact. At this point, final route options subjected to a fine-filter assessment to predict the presence of significant wildlife habitat.

Ecological Land Classification (ELC) Interpretation from High Resolution Aerial Imagery

All of the interpretation work discussed below was completed by an Ontario certified interpreter.

ECL classification was conducted on a 600m wide corridor around the centre line of all proposed power lines and new road access route options. Shapefiles for areas of interest (project areas) were created by KBMs GIS support group, and provided to the interpreter. The interpreter obtained and reviewed background inventory data for the project areas, including the current MNR Forest Resource Inventory (FRI) dataset as obtained through MNR's information portal.

Using one of KBMs softcopy systems, the interpreter delineated a polygon for each unique forested and non-forested type encountered in the project areas. Ontario's Forest Information Manual (FIM) specifications regarding minimum polygon sizes were followed. The polygon layer was checked for topology errors and revised as necessary.

Each of the polygons was then assigned attributes by the interpreter. MNRs eFRI data entry tool was used to enter the attributes including tree species, tree average age, tree average height, ecosite, etc. Ontario's harmonized ecosystem classification system was used.

The MNR's error-checking validation tool was run on completed sections and revisions were made as necessary. The resulting ELC were used as a component of the fine-filter habitat assessment (see below).

Fine Filter – to Predict Significant Habitats

The objective of the fine filter exercise was to determine areas to focus field surveys for species at risk, provincially tracked species and significant wildlife habitat along Xeneca's proposed power corridors and access roads. In August, 2012, the methodology was presented to MNR to garner support for the proposed approach. MNR proposed some updates to the approach, and the approach was adapted accordingly to accommodate two opportunities for MNR district level review of the results/progress.

The exercise began by working with MNR and Northern Bioscience to compile a preliminary list of species of interest for each proposed corridor. In so doing, the following data sources were used:

- Atlas of the Breeding Birds of Ontario: www.birdsontario.org
- Natural Heritage Information Centre: nhic.mnr.gov.ca/MNR.nhic/nhic.cfm
- Royal Ontario Museum-MNR: www.rom.on.ca/ontario/risk.php
- NatureServe: www.natureserve.org
- OMNR Significant Wildlife Habitat Technical Guide-Appendix G
- Ontario Species at Risk: www.mnr.gov.on/en/Business/Species/index.html
- Oldham, M .J. and S.R. Brinker. 2009. Rare Vascular Plants of Ontario. Fourth Edition. Natural Heritage Information Centre. Ontario Ministry of Natural Resources, Peterborough, Ontario. 188 pp.

The preliminary species lists were then provided to MNR district staff for review and input. Final species lists were created and formed the basis for the remainder of the exercise.

KBM and Northern Bioscience then worked together to identify characteristics of the habitat for each species that could be used to assess the presence of each type of habitat along the length of the proposed corridors. The habitat characteristic identification was carried out using a variety of data sources.

To streamline the habitat assessment, key species were grouped together based on similar habitat requirements. Habitat classifications for generalists and species whose habitat is complex and very specific at the microsite level were excluded from this analysis. Notable exclusions to the GIS habitat query were the Massasauga Rattlesnake, Wood Turtle, Blanding's Turtle, and Milksnake. Consultation with District OMNR Species at Risk Biologists will be completed as a more reliable and preferred alternative.

KBM had previously compiled a comprehensive set of GIS data layers for the project, as well as acquiring 20 cm resolution digital true color ortho-photography. Habitat requirements for each group of species were "translated" into ELC ecosite codes and other parameters such as percent canopy closure, tree age, and species composition (see Appendix). Minimum area requirements were noted in the parameters but were not included within the context of the GIS analysis due to the relatively narrow width of the corridor delineated into ecosites (600m), and since adjacent habitat types were unknown.

The translation of habitat requirements into Ecological Land Classification (ecosites) was completed by biologists at KBM and Northern Bioscience, and was based on their interpretation, unless otherwise noted in the sources.

Finally, KBM implemented the methodology by conducting GIS analysis on each of the proposed lines and new access roads to identify the likelihood of significant wildlife habitat along each corridor for each set of parameters. Results of the analysis were presented to MNR for review and to seek concurrence on the identification of priority sites for field verification in the spring of 2013 to support permitting applications expected in the fall of 2013.

The results of field assessments have been summarized by Northern Bioscience in separate habitat reports.

Species At Risk

Where a contravention of the Endangered Species Act (ESA) is identified and confirmed, Xeneca may require overall benefit permits in order to proceed with new access road and power line construction. MNR has committed to reviewing proposed new power lines and access roads to determine the risks of contravening the ESA. MNR can then provide guidance as to what surveys may be required in what areas to support permitting. It is anticipated that many impacts can be avoided by implementing timing restrictions to ensure work avoids sensitive times for species. In other cases, a minor or major road/line re-routing would be needed.

Results – MNR "Coarse Filter" Analysis for Proposed Roads and Lines

The following summarizes comments received from MNR as a result of the coarse filter analysis.

Lakes with values that require AOC prescription equivalents:
Elizabeth Lake – stocked lake trout, pike, bass (coldwater)
Nameless Lake – stocked BT (coldwater)
Augusta Lake – walleye, bass, pike (warm / cool water)
Foster # 5 Lake – backcountry walleye (access may be a consideration) (inflow to Elizabeth)
Foster # 6 Lake – largemouth bass & pike

The standard Area of Concern prescription applied to the construction of Forest Access Roads in the Northshore Forest Management Plan is a 30-90m slope-dependant reserve, as per table below (as measured from high water mark).

Slope (%)	Reserve
0 – 15	30 m
16 – 30	50 m
31 – 45	70 m
46 +	90 m

Other Values

Other values that should be considered in the planning and design of the road/power line corridor include:
1) The area you intend to access is a known wildlife corridor for seasonal migration of white tailed deer
2) There is an established portage trail between Elizabeth Lake and Augusta Lake that will require maintenance

3) There is an established Wildlife Assessment Research Plot in the area immediately to the east of the center line of the proposed road corridor, where it connects to Penage Lake Road - efforts will be required to ensure this value is not disturbed during road construction, should it occur in this location.
4) The existing trails in the area of the proposed power line corridor are used as snowmobile trails

Species-at-Risk

- MNR currently has several recent Whip-poor-will ("threatened" under the *Endangered Species Act*, 2007, with general habitat protection) occurrences within 2 km of the proposed road corridor as well as within 3 km of the proposed power line corridor. An inspection of aerial photography has revealed the potential presence of Whip-poor-will habitat within and adjacent to the proposed road and power line corridors.
- MNR currently has one Blanding's Turtle ("threatened" under the ESA with general habitat protection coming into effect no later than June 30, 2013) occurrence within 5 km of the proposed power line corridor. An inspection of aerial photography has revealed the potential presence of Blanding's Turtle habitat within and adjacent to the proposed road and power line corridors.
- Other species at risk that have a higher probability of encounter in the study area include Chimney Swift ("threatened" with general habitat protection) and Massasauga Rattlesnake ("threatened"). Several special concern species and their habitats may also be in the area.
- MNR has a number of species at risk survey protocols that outline the amount of effort, timing windows, and methodologies recommended. Deviations from these guidelines could result in inconclusive findings, and the need for additional surveys. Prior to conducting surveys, it is recommended that the proponent contacts the MNR Species at Risk biologist to discuss the requirements.
- Visual survey methods (ex. auditory surveys for Whip-poor-will) do not generally require ESA authorizations. However, surveys involving the handling of threatened or endangered species at risk (ex. hoop net trapping for Blanding's Turtles) should be issued an ESA 17(2)(b) permit.

Multiple Corridors

Sudbury District has indicated previously to Xeneca the preference for one corridor for power lines and access roads, as this reduces the amount of disturbance on the landscape. If the intention is to establish a year round access road for installation and maintenance along the power line route, (ie. requiring culvert installations through the drainage and wetland areas along the proposed power line corridor), then MNR suggests that Xeneca consider developing a single corridor to accommodate full access and power line requirements.
If the intention for the power line corridor is to minimize disturbance by creating a trail or seasonal corridor (ie. winter road, ATV trial, etc.), then constructing the access road in the planned location may be a better long-term option, as there are fewer watercrossings and wetland areas along the proposed access route.
In general, Xeneca is encouraged to utilize the same corridor for both road and power lines in order to minimise the ecological footprint. You may also wish to consider the ESA 17(2)(c) permitting and overall benefit requirements when developing multiple corridors.

Results – Final Routes for "Fine Filter" Analysis

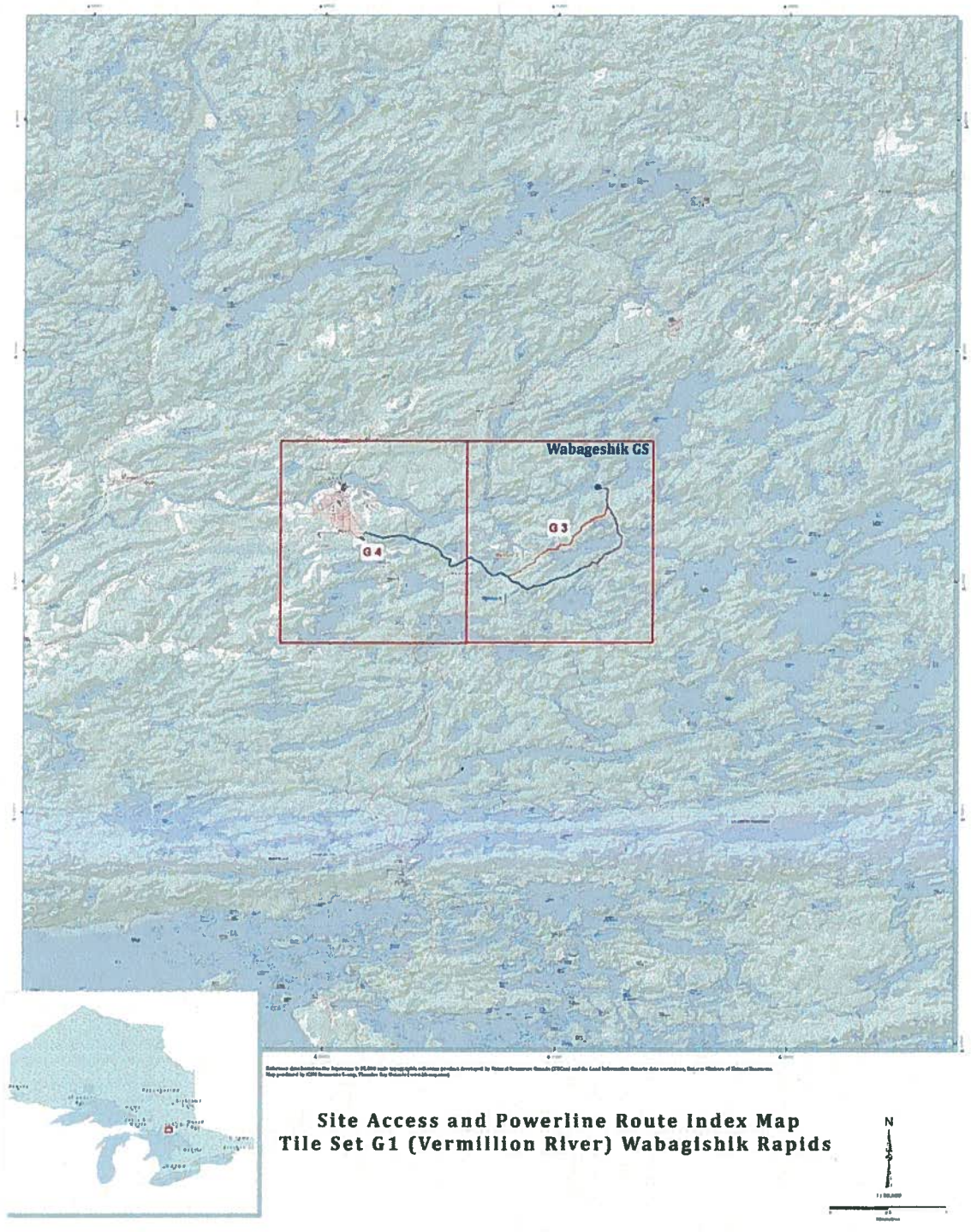


Figure 1. Wabagishik Rapids Site Map

Description of Proposed Power Line Route Options:

The following describes power line options for Wabagishik. Statistics for both options can be found in Table 1.

Both options originate at a PCC located near the southern outskirts of the town of Espanola (Figure 2). The line would then run east from the PCC towards the Penage Lake Road where it continues east to a common point east of Brazil Lake where it separates into two routing options designed to minimize impact on identified values and avoid patent land. The total line distance will vary between 14.3 km and 16.1 km depending on the final route choice.

Option 1 would travel from the PCC to a common point east of Brazil Lake. From here it would follow the Panage Lake Rd. east-northeast near the southern edge of Elizabeth Lake. From there, the line would travel north between Elizabeth Lake on the west and Augusta Lake on the east towards the generating station (GS) location (Figure 3). This option has a total distance of 16.1 km with 13 existing water crossings and four new ones. This line option is entirely on Crown land, and crosses a recreational snowmobile trail approximately 900m southeast of the GS.

The alternate power route (Option 2) would travel from the PCC to a common point east of Brazil Lake, and continue northeast across Brazil Creek (at Elizabeth Lake). From there, the line would travel northeast to just north of Nameless Lake. It would meet an existing recreational snowmobile trail and the proposed option 1 north-northeast of Nameless Lake before heading north to the GS. This line option is 14.3 km in length and involves 17 existing water crossings and three new ones.

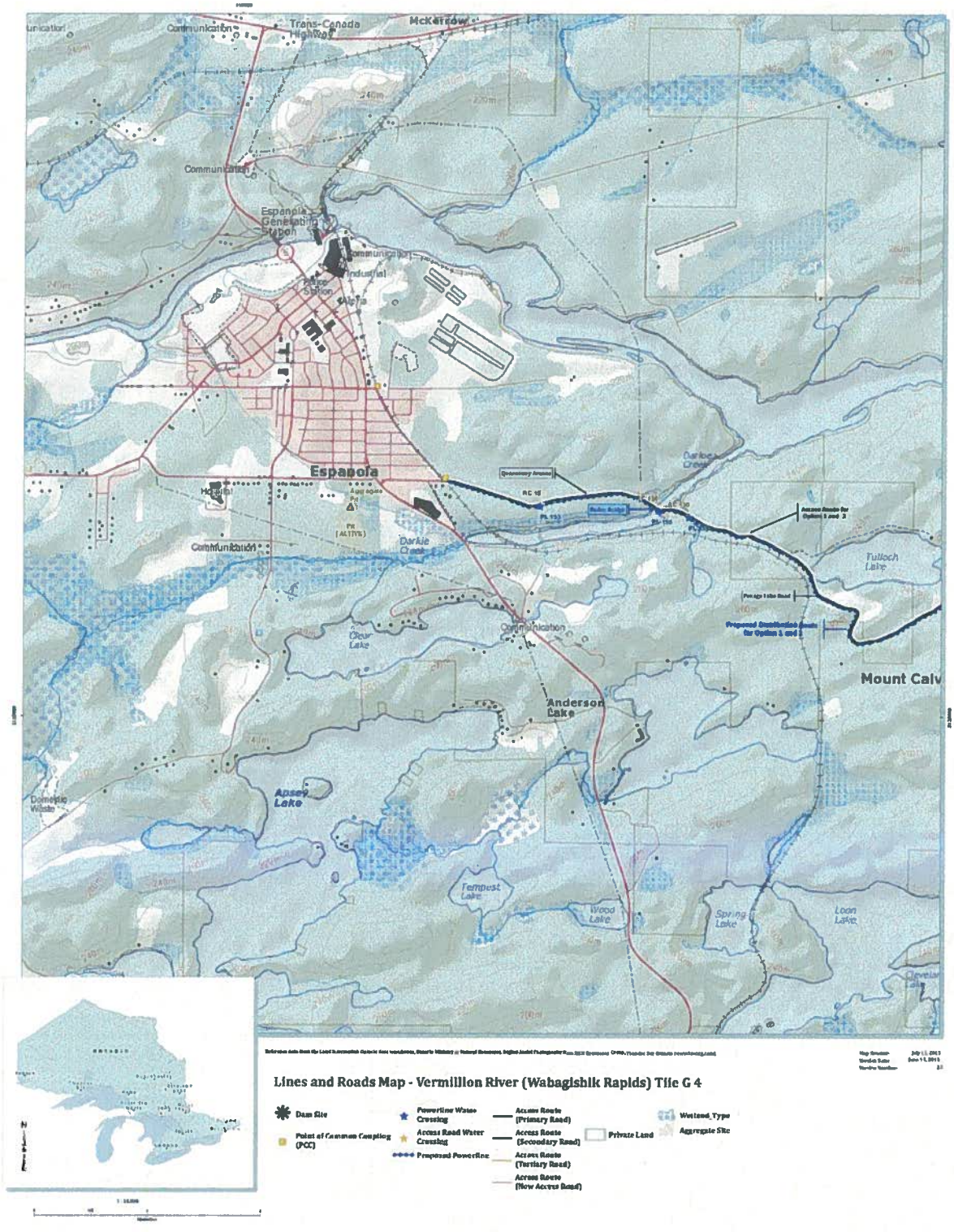


Figure 2. Proposed power line and road access for Wabagishik.

Table 1. Revised Line Route Summary Statistics for Wabagishik Falls.

				Summary Statistics					
					Water Crossing			Wetlands	
Route	Ownership	Road Type	Frequency	Length (m)	Hwy	Existing	New	Edge	Crossing
Option 1	Crown	Existing Road	8	7,402	-	10	-	-	-
	Crown	New Corridor	2	4,968	-	-	4	-	-
	Private	Existing Road	4	3,703	-	3	-	-	-
			TOTAL	**16,073**		**13**	**4**		
Option 2	Crown	Existing Road	7	4,528	-	10	-	-	-
	Crown	Existing Trail	1	311	-	-	1	-	-
	Crown	New Corridor	2	4,080	-	-	2	-	-
	Private	Existing Road	5	4,742	-	5	-	-	-
	Private	Existing Trail	1	615	-	2	-	-	-
			TOTAL	**14,276**		**17**	**3**		

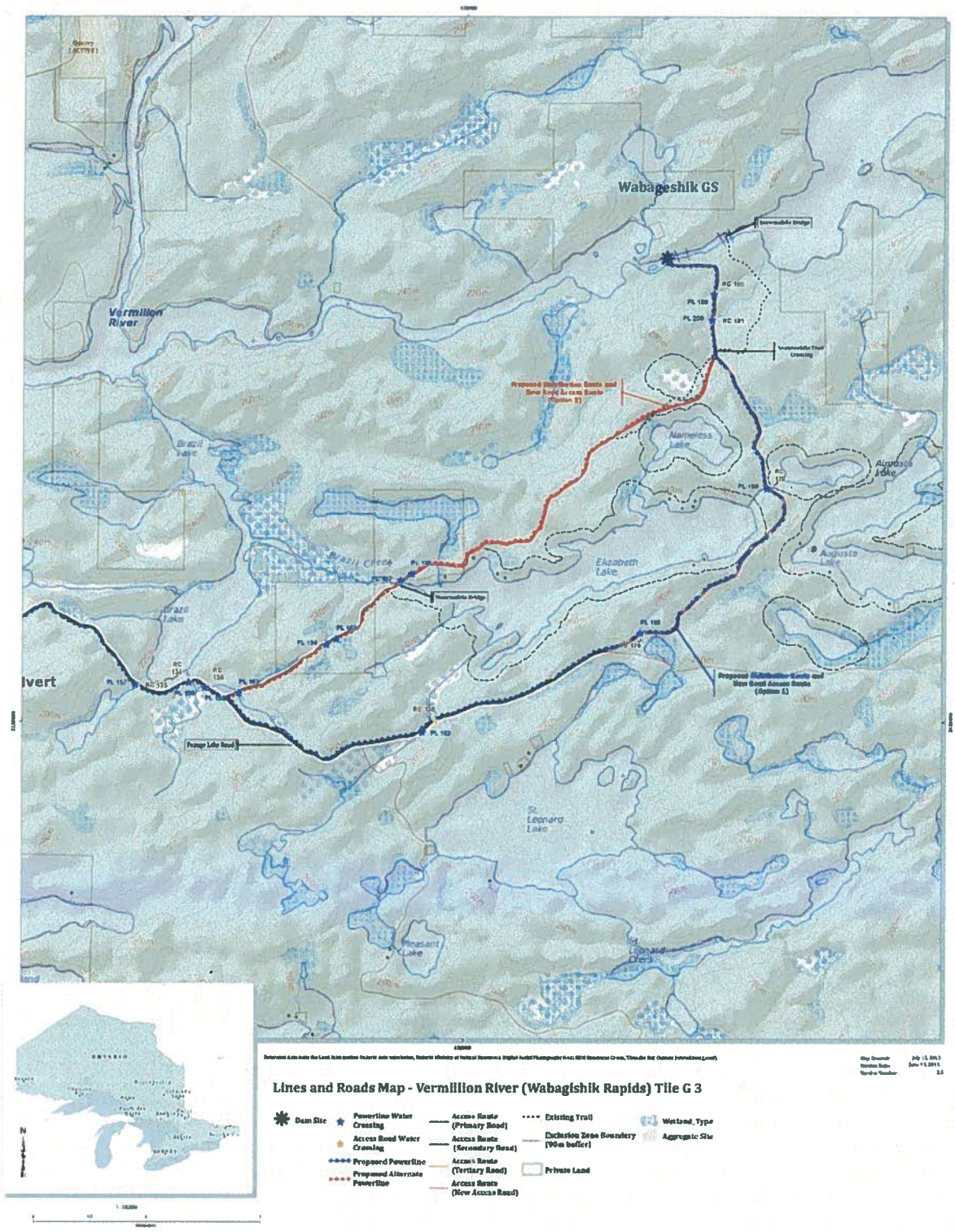


Figure 3. Proposed power line and road access for Wabagishik.

Description of Proposed Access Route Options:

The Wabagishik Rapids site will be accessed using existing gravel access roads, with some sections of new road required between the existing road and the GS location. Statistics for each proposed road option can be found in Table 2. Road maintenance and potential upgrades to existing roads and water crossings will be discussed with the SFL holder for the project area, the city of Espanola and the local Foster Truman roads board. Responsibility for road and water crossing upgrades will be confirmed during further discussion with the above mentioned parties.

There are two options for accessing the Wabagishik site by road, both originating from the Panache Lake road east of the town of Espanola (Figure 1 and 2). This road is classified as a primary road with current maintenance responsibility falling to the city of Espanola and the local Foster Truman roads board. A bailey bridge spans Darkie creek with a rated capacity of 50 tonnes and a width of 16 ft (Figure 4).

Figure 4. Bailey bridge at Darkie creek & section of Panache Lake Rd.

The first option for permanent road access to the Wabagishik Falls generator would follow adjacent to power line route – Option 1 (Figure 3).

The second option for permanent road access to the site would then continue along a newly built road adjacent to the alternate power line route - Option 2 (Figure 3). The access road would cross an existing recreational snowmobile trail 900m south of the GS. This road would also require a single water crossing east of Elizabeth Lake. The terrain along this route is quite variable consisting of larger rock outcroppings transitioning into low lying wet areas.

Figure 5. Terrain north of Nameless Lake.

Currently the only existing road access near the proposed GS is along a recreational snowmobile trail which crosses the Vermillion river approximately 900m upstream of the GS (Figure 7).

Figure 6. Existing Crossing 900m upstream from the GS.

This access road crosses patent land, but it seems to be used regularly to access a public boat launch on Elizabeth Lake as well as the recreational snowmobile trail. Several drainage crossings have been repaired leading up to the public boat launch (Figure 7).

Figure 7. Existing access road through patent land southwest of the Elizabeth Lake boat launch.

A bridge structure is in place spanning Brazil Creek next to the Elizabeth Lake boat launch. This bridge has a maximum rated capacity of 10 tons and was installed primarily to accommodate a snowmobile grooming machine (Figure 8).

Figure 8. Elizabeth Lake snowmobile bridge.

Beyond the Elizabeth Lake Bridge access is quite poor and requires the use of an ATV. Soils along the trail and throughout the area are predominantly finer textured loams and clays.

Figure 9. Existing snowmobile trail northeast of the Brazil Creek crossing.

Table 2. Summary of new access road and water crossings.

	Summary Statistics							
					Water Crossing		Wetlands	
Route	Road Type	Frequency	Length	Highway	Existing	New	Edge	Crossing
Option 1	Primary	6	11,109	-	7	-	-	-
	New Access Road	2	4,974	-	-	4	-	-
		TOTAL	**16,083**		**7**	**4**		
Option 2	Primary	2	7,347	-	6	-	-	-
	New Access Road	6	5,044	-	2	2	-	1
	Secondary	3	1,899	-	3	-	-	-
		TOTAL	**14,290**		**11**	**2**		**1**

Results – Rapid Assessment (RAT*) of Potential Provincially Significant Wetlands

See Appendix.

Results – Ecological Land Classification:

The results of the Ecological Land Classification for a 600m wide corridor on power line and new road access options are summarized in the tables below. The first set of tables summarizes the area and percentage by polytype for each of:

- power line corridor option
- merged power line and road access corridor options
- new road access corridors

The second set of tables summarizes area and percentage by primary and secondary ecosite group and label for each of the three types of corridor listed above. In the case of secondary ecosites, it is important to note that the area totals do not reflect the total area of the secondary

ecosite. Instead, they reflect the total area of the primary ecosite polygons for which the secondary ecosite forms an unknown portion.

ELC Results by Polytype

Table 3. Ecological land classification of proposed power line options – by polytype.

	Option 1		Option 2	
Polytype	**Area (ha)**	**%**	**Area (ha)**	**%**
Brush and Alder	1.27	0.13	8.16	0.94
Forest	774.97	79.07	693.97	79.69
Open Muskeg	41.96	4.28	33.61	3.86
Rock	27.14	2.77	0.00	0.00
Treed Muskeg	4.55	0.46	0.00	0.00
Unclassified	64.96	6.63	62.41	7.17
Water	65.20	6.65	72.68	8.35
Total	**980.04**		**870.82**	

Table 4. Ecological land classification of combined power line and new road access corridors – by polytype.

	Power Line Option 1, Road Option 1		Power Line Option 2, Road Option 2	
Polytype	**Area (ha)**	**%**	**Area (ha)**	**%**
Brush and Alder	1.27	0.13	8.16	0.93
Forest	782.29	79.06	700.57	80.00
Open Muskeg	42.05	4.25	33.61	3.82
Rock	27.84	2.81		
Treed Muskeg	4.60	0.46		
Unclassified	64.99	6.57	62.41	7.10
Water	66.43	6.71	74.64	8.50
Total	**989.47**		**879.39**	

Table 5. Ecological land classification of proposed new road access corridors – by polytype.

Polytype	Option 1		Option 2	
	Area (ha)	%	Area (ha)	%
Brush and Alder	0.00	0.00	4.12	1.26
Forest	282.88	86.49	283.89	86.94
Open Muskeg	1.71	0.52	0.16	0.05
Rock	10.38	3.17	0.00	0.00
Treed Muskeg	4.60	1.41	0.00	0.00
Unclassified	1.49	0.46	2.82	0.86
Water	26.02	7.95	35.54	10.89
Total	**327.07**		**326.53**	

ELC Results by Ecosite Group and Label

Table 6. Ecological land classification of proposed power line option 1 – by ecosite group and label.

		Primary Ecosite		Secondary Ecosite	
Ecosite Group	**Ecosite Label**	**AREA (ha)**	**%**	**AREA (ha)**	**%**
Anthropogenic Ecosites	195) Active Fine Clean Fill	7.19	0.73	0.00	0.00
Anthropogenic Ecosites	197) Pavement/Concrete	3.39	0.35	0.00	0.00
Anthropogenic Ecosites	198) Compact Graveled Surface	35.16	3.59		0.00
Anthropogenic Ecosites	997) Commercial / Industrial Unclassified	2.95	0.30	0.00	0.00
Anthropogenic Ecosites	998) Utilities Unclassified	2.16	0.22	0.00	0.00
Anthropogenic Ecosites	999) Residential Unclassified	14.11	1.44	0.00	0.00
Dry or Sandy Ecosites	35) Dry or Sandy: Pine - Black Spruce Conifer	22.69	2.31	18.85	4.40
Dry or Sandy Ecosites	33) Dry or Sandy: Red Pine - White Pine Conifer	0.00	0.00	15.04	3.51
Fresh or Sandy or Dry to Fresh Coarse Loamy Ecosites	48) Dry to Fresh or Coarse: Red Pine - White Pine Conifer	87.52	8.93	59.78	13.95
Fresh or Sandy or Dry to Fresh Coarse Loamy Ecosites	50) Dry to Fresh or Coarse: Pine - Black Spruce Conifer	18.85	1.92	0.00	0.00
Fresh or Sandy or Dry to Fresh Coarse Loamy Ecosites	51) Dry to Fresh or Coarse: Hemlock - Cedar Conifer	49.41	5.04	29.35	6.85
Fresh or Sandy or Dry to Fresh Coarse Loamy Ecosites	52) Dry to Fresh or Coarse: Spruce - Fir Conifer	191.57	19.55	83.72	19.54
Fresh or Sandy or Dry to Fresh Coarse Loamy Ecosites	55) Dry to Fresh or Coarse: Aspen - Birch Hardwood	187.75	19.16	33.35	7.78
Fresh or Sandy or Dry to Fresh Coarse Loamy Ecosites	58) Dry to Fresh or Coarse: Maple Hardwood	86.33	8.81	0.00	0.00
Moist or Sandy to Coarse Loamy Ecosites	64) Moist or Coarse: Red Pine - White Pine Conifer	4.32	0.44	0.00	0.00
Moist or Sandy to Coarse Loamy Ecosites	65) Moist or Coarse: Pine - Black Spruce Conifer	8.18	0.83	0.00	0.00
Moist or Sandy to Coarse Loamy Ecosites	66) Moist or Coarse: Hemlock - Cedar Conifer	7.69	0.78	0.00	0.00
Moist or Sandy to Coarse Loamy Ecosites	67) Moist or Coarse: Spruce - Fir Conifer	5.51	0.56	17.99	4.20
Moist or Sandy to Coarse Loamy Ecosites	70) Moist or Coarse: Aspen - Birch Hardwood	0.00	0.00	1.04	0.24
Permanently Flooded or Hydric Ecosites	128) Intermediate Conifer Swamp	6.84	0.70	0.00	0.00

		Primary Ecosite		Secondary Ecosite	
Ecosite Group	**Ecosite Label**	**AREA (ha)**	**%**	**AREA (ha)**	**%**
Permanently Flooded or Hydric Ecosites	129) Rich Conifer Swamp	16.57	1.69	7.69	1.79
Permanently Flooded or Hydric Ecosites	130) Intolerant Hardwood Swamp	5.76	0.59	1.27	0.30
Permanently Flooded or Hydric Ecosites	135) Organic Thicket Swamp	1.27	0.13	13.49	3.15
Permanently Flooded or Hydric Ecosites	136) Sparse Treed Fen	4.55	0.46	0.00	0.00
Permanently Flooded or Hydric Ecosites	140) Open Moderately Rich Fen	18.19	1.86	0.00	0.00
Permanently Flooded or Hydric Ecosites	142) Mineral Meadow Marsh	23.77	2.43	0.00	0.00
Rock Ecosites	164) Rock Barren	27.14	2.77	0.00	0.00
Very Shallow Ecosites	13) Very Shallow or Dry to Fresh: Hemlock - White Cedar Conifer	0.00	0.00	4.02	0.94
Very Shallow Ecosites	14) Very Shallow or Dry to Fresh: Conifer	34.64	3.53	35.67	8.32
Very Shallow Ecosites	18) Very Shallow or Dry to Fresh: Maple Hardwood	41.34	4.22	50.04	11.68
Very Shallow Ecosites	16) Very Shallow or Dry to Fresh: Aspen - Birch Hardwood	0.00	0.00	57.25	13.36
Water	0) Water	65.20	6.65	0.00	0.00
	Total	**980.05**		**428.55**	

Table 7. Ecological land classification of proposed power line option 2 – by ecosite group and label.

		Primary Ecosite		Secondary Ecosite	
Ecosite Group	**Ecosite Label**	**AREA (ha)**	**%**	**AREA (ha)**	**%**
Anthropogenic Ecosites	195) Active Fine Clean Fill	7.19	0.83	0.00	0.00
Anthropogenic Ecosites	197) Pavement/Concrete	3.39	0.39	0.00	0.00
Anthropogenic Ecosites	198) Compact Graveled Surface	32.30	3.71	0.00	0.00
Anthropogenic Ecosites	997) Commercial / Industrial Unclassified	2.95	0.34	0.00	0.00
Anthropogenic Ecosites	998) Utilities Unclassified	2.16	0.25	0.00	0.00
Anthropogenic Ecosites	999) Residential Unclassified	14.42	1.66	0.00	0.00
Dry or Sandy Ecosites	35) Dry or Sandy: Pine - Black Spruce Conifer	0.00	0.00	18.85	5.21
Dry or Sandy Ecosites	33) Dry or Sandy: Red Pine - White Pine Conifer	22.69	2.61	15.04	4.16

		Primary Ecosite		Secondary Ecosite	
Ecosite Group	**Ecosite Label**	**AREA (ha)**	**%**	**AREA (ha)**	**%**
Fresh or Sandy or Dry to Fresh Coarse Loamy Ecosites	48) Dry to Fresh or Coarse: Red Pine - White Pine Conifer	73.51	8.44	35.22	9.74
Fresh or Sandy or Dry to Fresh Coarse Loamy Ecosites	50) Dry to Fresh or Coarse: Pine - Black Spruce Conifer	18.85	2.16	0.00	0.00
Fresh or Sandy or Dry to Fresh Coarse Loamy Ecosites	51) Dry to Fresh or Coarse: Hemlock - Cedar Conifer	57.25	6.57	29.35	8.11
Fresh or Sandy or Dry to Fresh Coarse Loamy Ecosites	52) Dry to Fresh or Coarse: Spruce - Fir Conifer	187.75	21.56	56.39	15.59
Fresh or Sandy or Dry to Fresh Coarse Loamy Ecosites	55) Dry to Fresh or Coarse: Aspen - Birch Hardwood	181.88	20.89	32.35	8.94
Fresh or Sandy or Dry to Fresh Coarse Loamy Ecosites	58) Dry to Fresh or Coarse: Maple Hardwood	106.50	12.23	0.00	0.00
Moist or Sandy to Coarse Loamy Ecosites	65) Moist or Coarse: Pine - Black Spruce Conifer	8.18	0.94	0.00	0.00
Moist or Sandy to Coarse Loamy Ecosites	67) Moist or Coarse: Spruce - Fir Conifer	6.55	0.75	13.19	3.65
Moist or Sandy to Coarse Loamy Ecosites	71) Moist or Coarse: Elm - Ash Hardwood	1.96	0.23	0.00	0.00
Moist or Sandy to Coarse Loamy Ecosites	70) Moist or Coarse: Aspen - Birch Hardwood	0.00	0.00	11.20	3.10
Permanently Flooded or Hydric Ecosites	129) Rich Conifer Swamp	6.42	0.74	6.66	1.84
Permanently Flooded or Hydric Ecosites	130) Intolerant Hardwood Swamp	0.59	0.07	7.62	2.11
Permanently Flooded or Hydric Ecosites	135) Organic Thicket Swamp	8.16	0.94	13.49	3.73
Permanently Flooded or Hydric Ecosites	140) Open Moderately Rich Fen	18.19	2.09	0.00	0.00
Permanently Flooded or Hydric Ecosites	142) Mineral Meadow Marsh	13.68	1.57	1.74	0.48
Permanently Flooded or Hydric Ecosites	146) Open Shore Fen	1.74	0.20	0.00	0.00
Very Shallow Ecosites	14) Very Shallow or Dry to Fresh: Conifer	8.00	0.92	26.76	7.40
Very Shallow Ecosites	18) Very Shallow or Dry to Fresh: Maple Hardwood	13.85	1.59	61.07	16.88
Very Shallow Ecosites	16) Very Shallow or Dry to Fresh: Aspen - Birch Hardwood	0.00	0.00	32.76	9.06
Water	0) Water	72.68	8.35	0.00	0.00
	Total	**870.82**		**361.69**	

Table 8. Ecological land classification of combined power line option 1 and new access road option 1 – by ecosite group and label.

		Primary Ecosite		Secondary Ecosite	
Ecosite Group	**Ecosite Label**	**AREA (ha)**	**%**	**AREA (ha)**	**%**
Anthropogenic Ecosites	195) Active Fine Clean Fill	7.19	0.73	0.00	0.00
Anthropogenic Ecosites	197) Pavement/Concrete	3.39	0.34	0.00	0.00
Anthropogenic Ecosites	198) Compact Graveled Surface	35.19	3.56	0.00	0.00
Anthropogenic Ecosites	997) Commercial / Industrial Unclassified	2.95	0.30	0.00	0.00
Anthropogenic Ecosites	998) Utilities Unclassified	2.16	0.22	0.00	0.00
Anthropogenic Ecosites	999) Residential Unclassified	14.11	1.43	0.00	0.00
Dry or Sandy Ecosites	33) Dry or Sandy: Red Pine - White Pine Conifer	0.00	0.00	15.04	3.47
Dry or Sandy Ecosites	35) Dry or Sandy: Pine - Black Spruce Conifer	22.69	2.29	18.85	4.34
Fresh or Sandy or Dry to Fresh Coarse Loamy Ecosites	48) Dry to Fresh or Coarse: Red Pine - White Pine Conifer	87.52	8.85	59.78	13.78
Fresh or Sandy or Dry to Fresh Coarse Loamy Ecosites	50) Dry to Fresh or Coarse: Pine - Black Spruce Conifer	18.85	1.91	0.00	0.00
Fresh or Sandy or Dry to Fresh Coarse Loamy Ecosites	51) Dry to Fresh or Coarse: Hemlock - Cedar Conifer	49.45	5.00	29.35	6.76
Fresh or Sandy or Dry to Fresh Coarse Loamy Ecosites	52) Dry to Fresh or Coarse: Spruce - Fir Conifer	192.67	19.47	84.44	19.46
Fresh or Sandy or Dry to Fresh Coarse Loamy Ecosites	55) Dry to Fresh or Coarse: Aspen - Birch Hardwood	190.27	19.23	33.94	7.82
Fresh or Sandy or Dry to Fresh Coarse Loamy Ecosites	58) Dry to Fresh or Coarse: Maple Hardwood	88.70	8.96	0.00	0.00
Moist or Sandy to Coarse Loamy Ecosites	64) Moist or Coarse: Red Pine - White Pine Conifer	4.32	0.44	0.00	0.00
Moist or Sandy to Coarse Loamy Ecosites	65) Moist or Coarse: Pine - Black Spruce Conifer	8.18	0.83	0.00	0.00
Moist or Sandy to Coarse Loamy Ecosites	66) Moist or Coarse: Hemlock - Cedar Conifer	7.69	0.78	0.00	0.00
Moist or Sandy to Coarse Loamy Ecosites	67) Moist or Coarse: Spruce - Fir Conifer	5.51	0.56	17.99	4.15
Moist or Sandy to Coarse Loamy Ecosites	70) Moist or Coarse: Aspen - Birch Hardwood	0.00	0.00	1.04	0.24
Permanently Flooded or Hydric Ecosites	128) Intermediate Conifer Swamp	6.84	0.69	0.00	0.00

		Primary Ecosite		Secondary Ecosite	
Ecosite Group	**Ecosite Label**	**AREA (ha)**	**%**	**AREA (ha)**	**%**
Permanently Flooded or Hydric Ecosites	129) Rich Conifer Swamp	16.96	1.71	7.69	1.77
Permanently Flooded or Hydric Ecosites	130) Intolerant Hardwood Swamp	5.85	0.59	1.27	0.29
Permanently Flooded or Hydric Ecosites	135) Organic Thicket Swamp	1.27	0.13	13.49	3.11
Permanently Flooded or Hydric Ecosites	136) Sparse Treed Fen	4.60	0.46	0.00	0.00
Permanently Flooded or Hydric Ecosites	140) Open Moderately Rich Fen	18.19	1.84	0.00	0.00
Permanently Flooded or Hydric Ecosites	142) Mineral Meadow Marsh	23.86	2.41	0.00	0.00
Rock Ecosites	164) Rock Barren	27.84	2.81	0.00	0.00
Very Shallow Ecosites	13) Very Shallow or Dry to Fresh: Hemlock - White Cedar Conifer	0.00	0.00	4.06	0.94
Very Shallow Ecosites	14) Very Shallow or Dry to Fresh: Conifer	35.35	3.57	36.70	8.46
Very Shallow Ecosites	16) Very Shallow or Dry to Fresh: Aspen - Birch Hardwood	0.00	0.00	59.19	13.64
Very Shallow Ecosites	18) Very Shallow or Dry to Fresh: Maple Hardwood	41.44	4.19	51.09	11.77
Water	0) Water	66.43	6.71	0.00	0.00
	Total	**989.47**		**433.92**	

Table 9. Ecological land classification of combined power line option 2 and new access road option 2 – by ecosite group and label.

		Primary Ecosite		Secondary Ecosite	
Ecosite Group	**Ecosite Label**	**AREA (ha)**	**%**	**AREA (Ha)**	**%**
Anthropogenic Ecosites	195) Active Fine Clean Fill	7.19	0.82	0.00	0.00
Anthropogenic Ecosites	197) Pavement/Concrete	3.39	0.39	0.00	0.00
Anthropogenic Ecosites	198) Compact Graveled Surface	32.30	3.67	0.00	0.00
Anthropogenic Ecosites	997) Commercial / Industrial Unclassified	2.95	0.34	0.00	0.00
Anthropogenic Ecosites	998) Utilities Unclassified	2.16	0.25	0.00	0.00
Anthropogenic Ecosites	999) Residential Unclassified	14.42	1.64	0.00	0.00
Dry or Sandy Ecosites	35) Dry or Sandy: Pine - Black Spruce Conifer	22.69	2.58	18.85	5.18
Dry or Sandy Ecosites	33) Dry or Sandy: Red Pine - White Pine Conifer	0.00	0.00	15.04	4.13
Fresh or Sandy or Dry to Fresh Coarse Loamy Ecosites	48) Dry to Fresh or Coarse: Red Pine - White Pine Conifer	73.51	8.36	35.22	9.68

Fresh or Sandy or Dry to Fresh Coarse Loamy Ecosites	50) Dry to Fresh or Coarse: Pine - Black Spruce Conifer	18.85	2.14	0.00	0.00
Fresh or Sandy or Dry to Fresh Coarse Loamy Ecosites	51) Dry to Fresh or Coarse: Hemlock - Cedar Conifer	57.25	6.51	29.35	8.06
Fresh or Sandy or Dry to Fresh Coarse Loamy Ecosites	52) Dry to Fresh or Coarse: Spruce - Fir Conifer	188.95	21.49	56.39	15.50
Fresh or Sandy or Dry to Fresh Coarse Loamy Ecosites	55) Dry to Fresh or Coarse: Aspen - Birch Hardwood	183.63	20.88	32.93	9.05
Fresh or Sandy or Dry to Fresh Coarse Loamy Ecosites	58) Dry to Fresh or Coarse: Maple Hardwood	109.61	12.46	0.00	0.00
Moist or Sandy to Coarse Loamy Ecosites	65) Moist or Coarse: Pine - Black Spruce Conifer	8.18	0.93	0.00	0.00
Moist or Sandy to Coarse Loamy Ecosites	67) Moist or Coarse: Spruce - Fir Conifer	6.55	0.74	13.19	3.62
Moist or Sandy to Coarse Loamy Ecosites	70) Moist or Coarse: Aspen - Birch Hardwood	0.00	0.00	11.2	3.08
Moist or Sandy to Coarse Loamy Ecosites	71) Moist or Coarse: Elm - Ash Hardwood	1.96	0.22		0.00
Permanently Flooded or Hydric Ecosites	129) Rich Conifer Swamp	6.42	0.73	6.66	1.83
Permanently Flooded or Hydric Ecosites	130) Intolerant Hardwood Swamp	0.59	0.07	7.62	2.09
Permanently Flooded or Hydric Ecosites	135) Organic Thicket Swamp	8.16	0.93	13.49	3.71
Permanently Flooded or Hydric Ecosites	140) Open Moderately Rich Fen	18.19	2.07		0.00
Permanently Flooded or Hydric Ecosites	142) Mineral Meadow Marsh	13.68	1.56	1.74	0.48
Permanently Flooded or Hydric Ecosites	146) Open Shore Fen	1.74	0.20		0.00
Very Shallow Ecosites	14) Very Shallow or Dry to Fresh: Conifer	8.00	0.91	26.76	7.35
Very Shallow Ecosites	18) Very Shallow or Dry to Fresh: Maple Hardwood	14.39	1.64	62.12	17.07
Very Shallow Ecosites	16) Very Shallow or Dry to Fresh: Aspen - Birch Hardwood	0.00	0.00	33.36	9.17
Water	0) Water	74.64	8.49	0.00	0.00
Total		**879.39**		**363.92**	

Table 10. Ecological land classification of proposed new road access option 1 – by ecosite group and label.

		Primary Ecosite		Secondary Ecosite	
Ecosite Group	**Ecosite Label**	**AREA (ha)**	**%**	**AREA (ha)**	**%**
Anthropogenic Ecosites	198) Compact Graveled Surface	1.49	0.46	0.00	0.00
Fresh or Sandy or Dry to Fresh Coarse Loamy Ecosites	51) Dry to Fresh or Coarse: Hemlock - Cedar Conifer	4.05	1.24	0.00	0.00
Fresh or Sandy or Dry to Fresh Coarse Loamy Ecosites	52) Dry to Fresh or Coarse: Spruce - Fir Conifer	38.26	11.70	24.71	12.90
Fresh or Sandy or Dry to Fresh Coarse Loamy Ecosites	55) Dry to Fresh or Coarse: Aspen - Birch Hardwood	88.21	26.97	10.97	5.73
Fresh or Sandy or Dry to Fresh Coarse Loamy Ecosites	58) Dry to Fresh or Coarse: Maple Hardwood	68.51	20.95	0.00	0.00
Moist or Sandy to Coarse Loamy Ecosites	66) Moist or Coarse: Hemlock - Cedar Conifer	7.69	2.35	0.00	0.00
Moist or Sandy to Coarse Loamy Ecosites	70) Moist or Coarse: Aspen - Birch Hardwood	0.00	0.00	0.84	0.44
Permanently Flooded or Hydric Ecosites	128) Intermediate Conifer Swamp	0.23	0.07	0.00	0.00
Permanently Flooded or Hydric Ecosites	129) Rich Conifer Swamp	10.54	3.22	7.69	4.01
Permanently Flooded or Hydric Ecosites	130) Intolerant Hardwood Swamp	5.85	1.79	0.00	0.00
Permanently Flooded or Hydric Ecosites	136) Sparse Treed Fen	4.60	1.41	0.00	0.00
Permanently Flooded or Hydric Ecosites	142) Mineral Meadow Marsh	1.71	0.52	0.00	0.00
Rock Ecosites	164) Rock Barren	10.38	3.17	0.00	0.00
Rock Ecosites	158) Cliff	0.00	0.00	12.46	6.50
Very Shallow Ecosites	14) Very Shallow or Dry to Fresh: Conifer	24.71	7.55	29.35	15.32
Very Shallow Ecosites	18) Very Shallow or Dry to Fresh: Maple Hardwood	34.84	10.65	48.44	25.28
Very Shallow Ecosites	13) Very Shallow or Dry to Fresh: Hemlock - White Cedar Conifer	0.00	0.00	4.05	2.11
Very Shallow Ecosites	16) Very Shallow or Dry to Fresh: Aspen - Birch Hardwood	0.00	0.00	53.10	27.71
Water	0) Water	26.02	7.95	0.00	0.00
	Total	**327.07**		**191.61**	

Table 11. Ecological land classification of proposed new road access option 2 – by ecosite group and label.

Ecosite Group	Ecosite Label	Primary Ecosite		Secondary Ecosite	
		AREA (ha)	%	AREA (ha)	%
Anthropogenic Ecosites	198) Compact Graveled Surface	2.51	0.77	0.00	0.00
Anthropogenic Ecosites	999) Residential Unclassified	0.31	0.09	0.00	0.00
Fresh or Sandy or Dry to Fresh Coarse Loamy Ecosites	48) Dry to Fresh or Coarse: Red Pine - White Pine Conifer	6.03	1.85	0.00	0.00
Fresh or Sandy or Dry to Fresh Coarse Loamy Ecosites	51) Dry to Fresh or Coarse: Hemlock - Cedar Conifer	8.94	2.74	0.00	0.00
Fresh or Sandy or Dry to Fresh Coarse Loamy Ecosites	52) Dry to Fresh or Coarse: Spruce - Fir Conifer	80.91	24.78	0.00	0.00
Fresh or Sandy or Dry to Fresh Coarse Loamy Ecosites	55) Dry to Fresh or Coarse: Aspen - Birch Hardwood	96.08	29.43	10.97	10.98
Fresh or Sandy or Dry to Fresh Coarse Loamy Ecosites	58) Dry to Fresh or Coarse: Maple Hardwood	73.19	22.41	0.00	0.00
Moist or Sandy to Coarse Loamy Ecosites	67) Moist or Coarse: Spruce - Fir Conifer	4.39	1.34	0.00	0.00
Moist or Sandy to Coarse Loamy Ecosites	70) Moist or Coarse: Aspen - Birch Hardwood	0.00	0.00	0.84	0.84
Permanently Flooded or Hydric Ecosites	129) Rich Conifer Swamp	0.00	0.00	6.16	6.17
Permanently Flooded or Hydric Ecosites	130) Intolerant Hardwood Swamp	0.28	0.09	4.39	4.40
Permanently Flooded or Hydric Ecosites	135) Organic Thicket Swamp	4.12	1.26	0.00	0.00
Permanently Flooded or Hydric Ecosites	142) Mineral Meadow Marsh	0.00	0.00	0.15	0.15
Permanently Flooded or Hydric Ecosites	146) Open Shore Fen	0.15	0.05	0.00	0.00
Very Shallow Ecosites	18) Very Shallow or Dry to Fresh: Maple Hardwood	14.07	4.31	43.51	43.56
Very Shallow Ecosites	14) Very Shallow or Dry to Fresh: Conifer	0.00	0.00	18.53	18.55
Very Shallow Ecosites	16) Very Shallow or Dry to Fresh: Aspen - Birch Hardwood	0.00	0.00	15.33	15.35
Water	0) Water	35.54	10.89	0.00	0.00
	Total	**326.53**		**99.88**	

Results – "Fine Filter" Habitat Assessment

Please note that the following area values for potentially significant habitat include polygon areas for which the primary ecosite has been deemed to be potential habitat, as well as polygons for which the secondary ecosite has been deemed to be potential habitat. A secondary ecosite by definition is: "A complex of two forested ecosites is allowed to be recorded when more than one ecosite is present as long as the secondary ecosite represents at least 20% of the area of the polygon and the area associated with the secondary ecosite does not exist in a manner suitable for meeting the minimum polygon size for creating a new polygon." (OMNR 2009[1]). As such, it is likely that total areas (ha) of potential wildlife habitat have been slightly over-estimated.

There were no potential areas of significant habitat identified for Peregrine Falcon, Eastern Meadowlark or for overwintering turtles. In addition, in terms of Whip-poor-will and Blanding's Turtle, Northern Bioscience conducted their field surveys in consultation with MNR Sudbury District staff and the results can be viewed in their final field report for this site.

Final field results for all species can be found in the final field report

Table 12. Area of significant habitat by species for proposed power line options.

		Option 1	Option 2
Species	**Habitat**	**Area (ha)**	
Bobolink	Hayfields and Pastures	23.77	15.42
Common Nighthawk	Open Rock Outcrops	250.10	142.43
Whip-poor-will	Open Rock Outcrops	252.25	144.59
Black Tern	Open wetland primarily marsh	23.77	15.42
Yellow Rail	Open wetland primarily marsh	23.77	15.42
Short-eared Owl	Open wetland primarily marsh	41.96	33.61
Least Bittern	Open wetland primarily marsh	23.77	15.42
Chimney Swift	Birds Associated with Buildings	17.50	17.81
Barn Swallow	Birds Associated with Buildings	17.50	17.81
Plant Alvars	Alvars	250.10	142.43
Snapping Turtle nesting	Turtle Habitat (Nesting)	980.06	870.82
Northern Map Turtle nesting	Turtle Habitat (Nesting)	980.06	870.82

[1] Ontario Ministry of Natural Resources. 2009. Forest Resources Inventory Technical Specifications 2009. Queens' Printer.

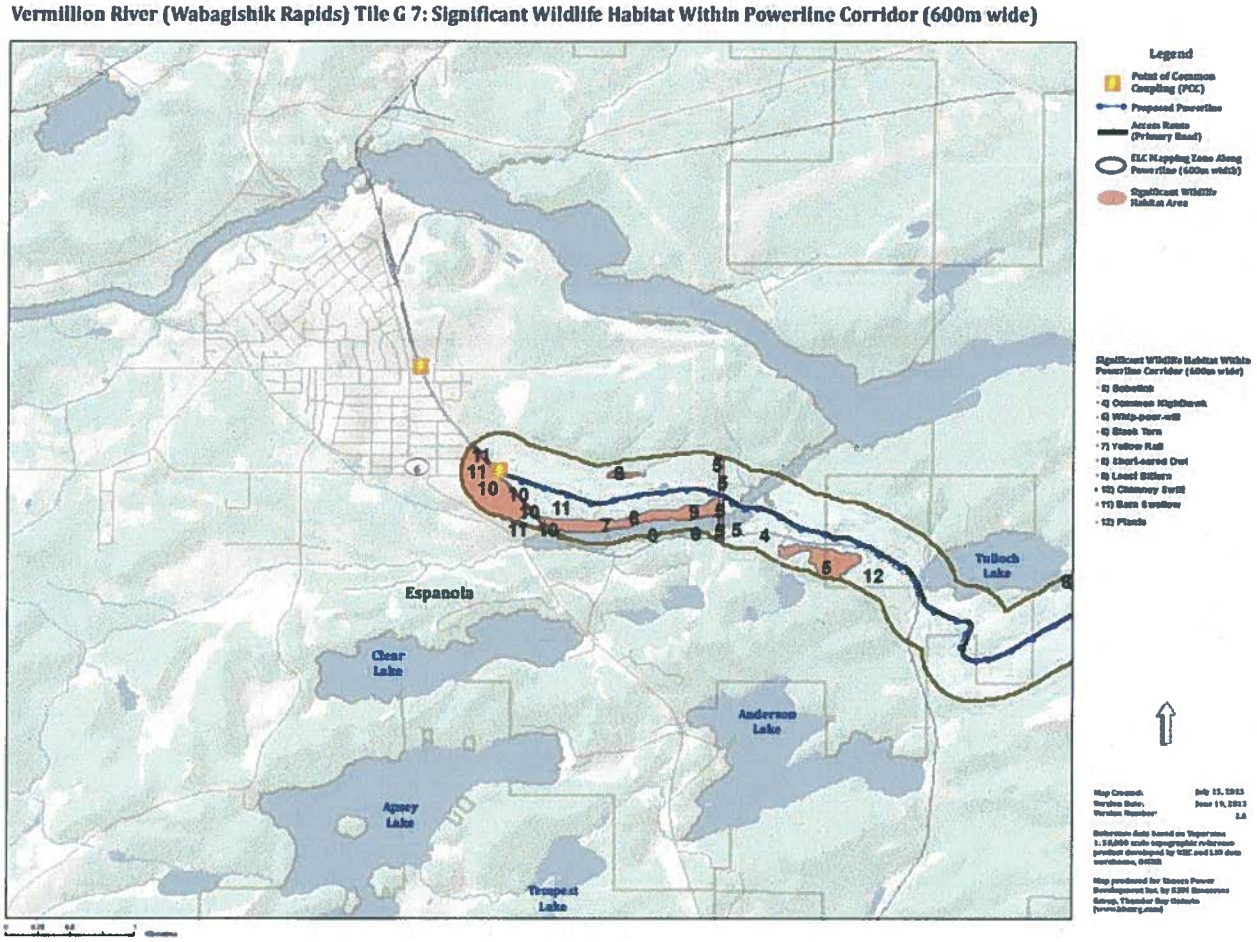


Figure 10. Tile G7: Significant wildlife habitat within powerline corridor (600m).

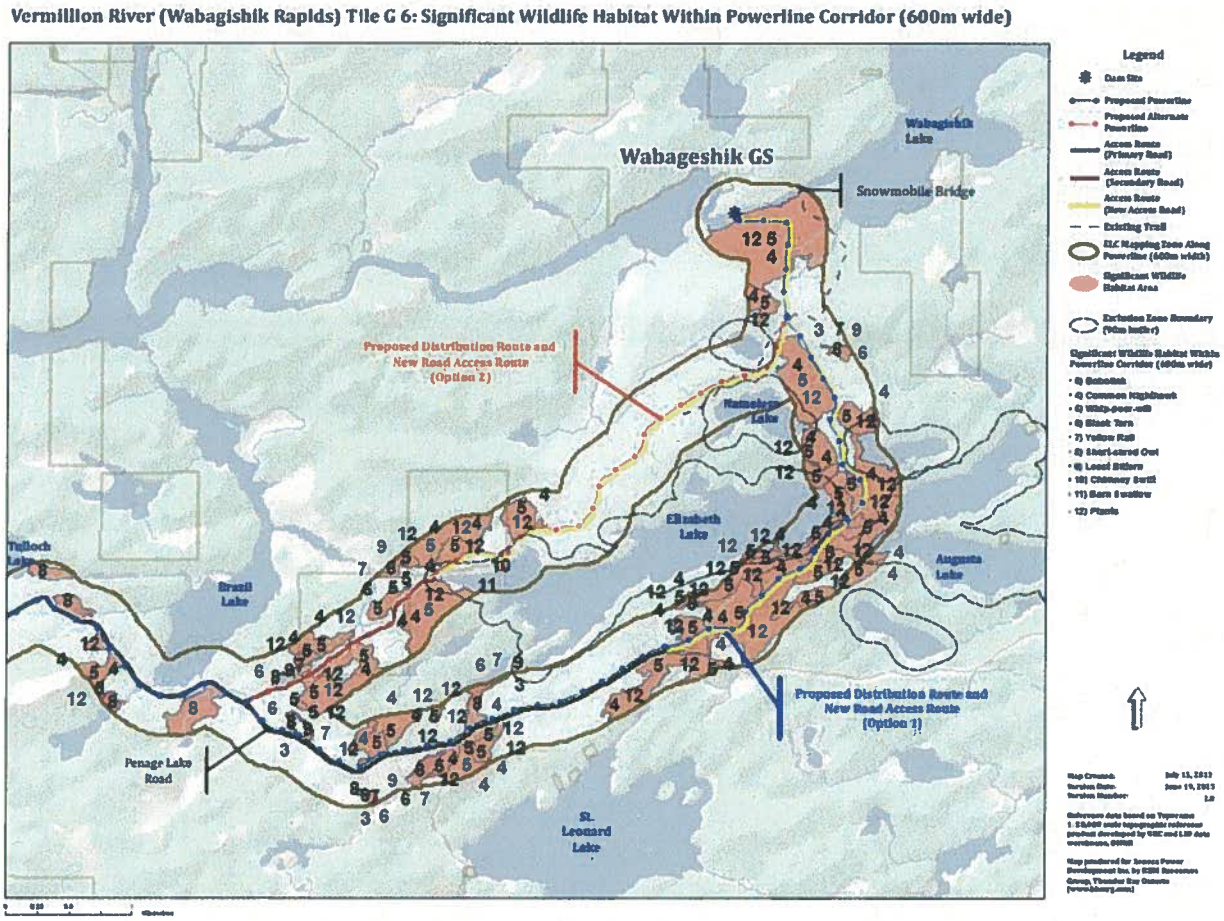


Figure 11. Tile G6: Significant wildlife habitat within powerline corridor (600m).

Table 13. Area of significant habitat by species for proposed new road access corridor options.

		Option 1	Option 2
Species	**Habitat**	**Area (ha)**	
Bobolink	Hayfields and Pastures	1.708	0.155
Common Nighthawk	Open Rock Outcrops	204.871	91.443
Whip-poor-will	Open Rock Outcrops	204.871	91.443
Black Tern	Open wetland primarily marsh	1.708	0.155
Yellow Rail	Open wetland primarily marsh	1.708	0.155
Short-eared Owl	Open wetland primarily marsh	1.708	0.155
Least Bittern	Open wetland primarily marsh	1.708	0.155
Chimney Swift	Birds Associated with Buildings	0.000	0.306
Barn Swallow	Birds Associated with Buildings	0.000	0.306
Plant Alvars	Alvars	204.871	91.443
Snapping Turtle Nesting	Turtle Habitat (Nesting)	327.072	326.535
Northern Map Turtle Nesting	Turtle Habitat (Nesting)	327.072	326.535

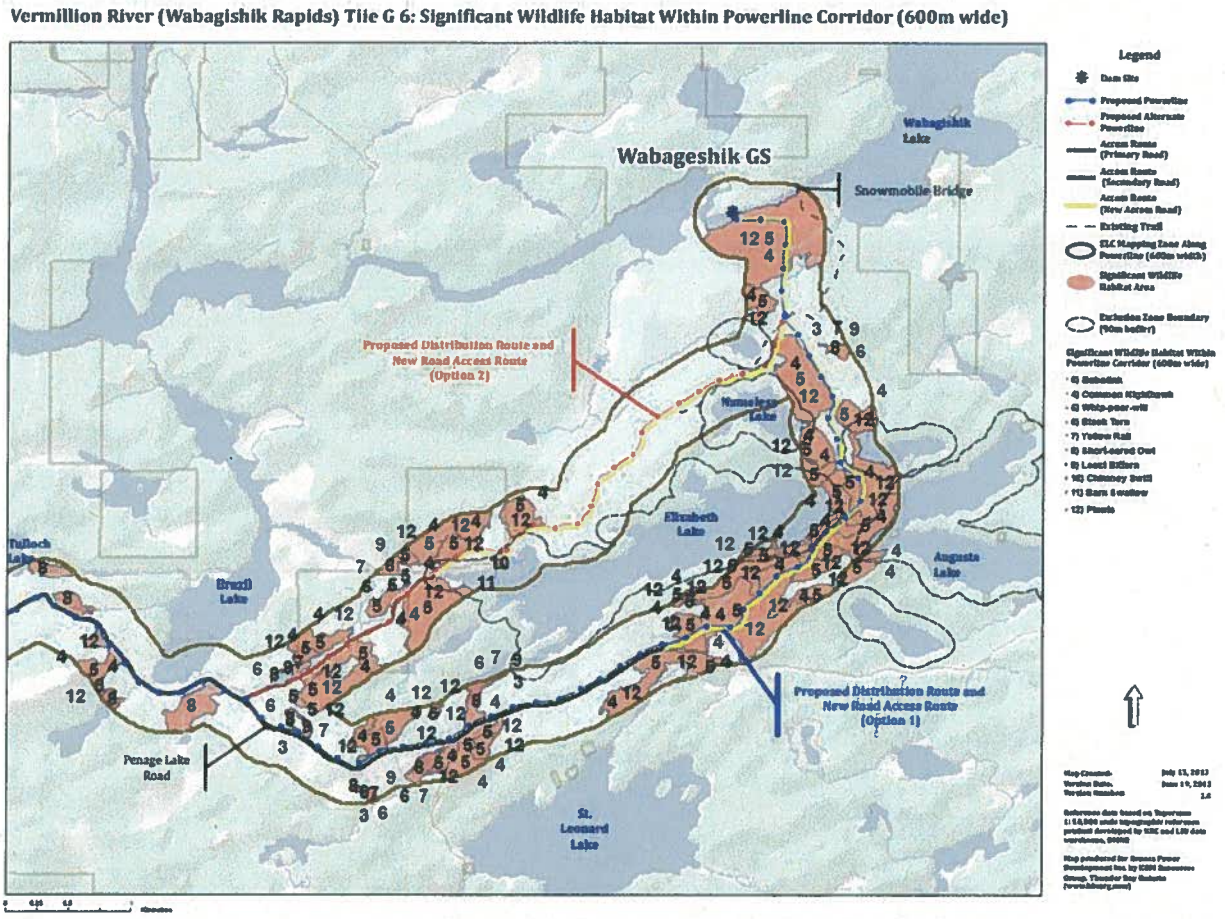


Figure 12. Tile G1: Significant wildlife habitat within new road access corridor (600m).

Appendix A – Parameters Used in "Fine Filter" Assessment

Appendix A – Parameters used for fine-filter habitat assessment analysis (GIS query exercise)

Habitat Type	Common Name	Latin Name	OMNR status or S-rank	Habitat Characteristics/Requirements	Wetlands e.g Marshes, Swamps	Open Water (lakes, ponds, rivers, streams)	Riparian (Rivers or nearshore areas	Grasslands	Parklands, Suburban areas	Thickets, Second growth	Old growth, mature stands	Forest edges	Deciduous woody debris	Sedge	Cliffs, Talus slopes, ravines	Colonial (bird)/ Seasonally concentrated (all other taxa)	Canny User	Provincially Rare	Area Sensitive	Sources		Corresponding Ecosite Descriptor	Sources
Dunes	Numerous Plants																					005, 006	
Alvars	Numerous Plants																					171, 172 (Need to be calcareous (modifier K) or associated with limestone or dolostone) and tree cover <60%.	Lee et al. 1998
Cliffs	Peregrine Falcon	*Falco peregrinus*	Threatened	rock cliffs, crags, especially situated near water; tall buildings in urban centres; threatened by chemical contamination; reintroduction efforts have been attempted in numerous locations throughout Ontario		x									x			x		SWHTG (2000) Appendix G, Ratcliff and Foster 2005	Potentially suitable nesting habitat includes cliffs with suitable ledges and a vertical drop of at least 15 m and a linear cliff length of at least 100 m. "Good" habitat has a vertical cliff face of at least 30 m and a minimum cliff length of 150 m. "Marginal" habitat has a vertical cliff face of 15 to 30 m and a minimum cliff length of 100 m.	158, 159N, 174, 175N	
Hayfields, Pastures	Eastern Meadolark	*Sturnella magna*	Threatened	open, grassy meadows, farmland, pastures, hayfields or grasslands with elevated singing perches; cultivated land and weedy areas with trees; old orchards with adjacent, open grassy areas >10 ha in size				x										x		SWHTG (2000) Appendix G	10 ha open grassy areas	008N, 020N, 029N, 044N, 060N, 077N, 93N, 109N,	
	Bobolink	*Dolichonyx oryzivorus*	Threatened	large, open expansive grasslands with dense ground cover; hayfields, meadows or fallow fields; marshes; requires tracts of grassland >50 ha	x			x										x		SWHTG (2000) Appendix G	50 ha grassland	141(143),144,109N,060N,093N, 008N,020N,029N,044N	
Open Rock Outcrops	Common Nighthawk	*Chordeiles minor*	Special Concern	open ground; clearings in dense forests; ploughed fields; gravel beaches or barren areas with rocky soils; open woodlands, flat gravel roofs				x	x	x		x								SWHTG (2000) Appendix G		180, 181N, 161, 162, 164, 165, 167, 168, 171, 171, , 177, 178, 180, 181, 183, 184, 187, 188, 109N, 093N, 060N, 044N, 029N, 008-028. Additionally, young cutovers and burns <20 years.	Wilson and Watts (2008)
	Whip-poor-will	*Caprimulgus vociferus*	Threatened	dry, open, deciduous woodlands of small to medium trees; oak or beech with lots of clearings and shaded leaflitter; wooded edges, forest clearings with little herbaceous growth; pine plantations; associated with >100 ha forests; may require 500 to 1000 ha to maintain population				x		x	x	x	x						x	SWHTG (2000) Appendix G	100 ha forest size	Early successional stands(<20 yrs). Coniferous plantations (Dev stage=FTG plant, new plant and >80% conifer), 005, 006, 008-028. 031, 032, 046, 047, 062, 063, 095, 096, 161, 162, 164, 165, 167, 168, 171, 172, U998.	Sandilands (2005)
Open wetland, primarily marsh	Black Tern	*Chlidonias niger*	Special Concern	wetlands, coastal or inland marshes; large cattail marshes, marshy edges of rivers, lakes or ponds, wet open fens, wet meadows; returns to same area to nest each year in loose colonies; must have shallow (0.5 to 1 m deep) water and areas of open water near nests; requires marshes >20 ha in size; feeds over adjacent grasslands for insects; also feeds on fish, crayfish and frogs	x	x	x	x							x		x	x		SWHTG (2000) Appendix G	20 ha marshes (lit), cumulative area >20ha (Al Harris)	008N, 020N, 029N, 044N, 060N, 077N, 093N, 109N, 110N, B142-153	
	Yellow Rail	*Coturnicops noveboracensis*	Special Concern	large, freshwater or brackish grass and sedge marshes with dense vegetation including bulrushes, horsetails, grasses; loss of wintering habitat and southern wetlands is limiting to this species	x													x		SWHTG (2000) Appendix G	cumulative area >20ha (Al Harris)	8 141-152	
	Short-eared Owl	*Asio flammeus*	Special Concern	grasslands, open areas or meadows that are grassy or bushy; marshes, bogs or tundra; both diurnal and nocturnal habits; ground nester; destruction of wetlands by drainage for agriculture is an important factor in the decline of this species; home range 25 -125 ha; requires 75-100 ha of contiguous open habitat	x			x							x		x	x		SWHTG (2000) Appendix G	75-100 ha contiguous open habitat (lit), cumulative area >20ha (Al Harris)	08, 09, 20, 11, 29, 30, 31, 44, 45, 46, 60, 61, 62, 77, 78, 79, 93, 94, 95, 109, 110, 111 138-151	
	Least Bittern	*Ixobrychus exilis*	Threatened	deep marshes, swamps, bogs; marshy borders of lakes, ponds, streams, ditches; dense emergent vegetation of cattail, bulrush, sedge, nests in cattails, intolerant of loss of habitat and human disturbance	x	x	x								x			x	x	SWHTG (2000) Appendix G	cumulative area >20ha (Al Harris)	141-152	
Birds Associated with Buildings	Chimney Swift	*Chaetura pelagica*	Threatened	commonly found in urban areas near buildings; nests in hollow trees, crevices of rock cliffs, chimneys; highly gregarious; feeds over open water		x		x	x		x	x			x	x	x			SWHTG (2000) Appendix G		U999-197,189X,158,159 (omited other habitats for this analysis)	
	Barn Swallow	*Riparia rustica*	Threatened (COSSARO)	farmlands or rural areas;cliffs, caves, rock niches; buildings or other man-made structures for nesting; open country near body of water	x	x	x	x				x			x	x				SWHTG (2000) Appendix G		U999-197,189X,158,159 (omited other habitats for this analysis)	
Turtle Habitat (overwintering)	Snapping Turtle	*Chelydra serpentina*	Special Concern																			148-152	Northern Bioscience (Al Harris)
Turtle Habitat (overwintering)	Northern Map Turtle	*Graptemys geographica*	Special Concern																			Open water areas (deeper lakes, rivers and streams)	SWHTG Se Criterion Schedule
Turtle Habitat (nesting)	Snapping Turtle	*Chelydra serpentina*	Special Concern																			1600m adjacent to. 138, 140-149	SWHTG Se Criterion Schedule
Turtle Habitat (nesting)	Northern Map Turtle	*Graptemys geographica*	Special Concern																			adjacent to. 138, 140-150	SWHTG Se Criterion Schedule

Appendix B – Results of Wetlands Rapid Assessment

Wetlands Rapid Assessment

Wabagishik Hydroelectric Project

Roads and Transmission Lines

April 2013

Prepared for:
Xeneca Power Development Inc.
5255 Yonge Street,
Suite 1200, Toronto, ON,
M2N 6P4

Prepared by:
Allan G. Harris

NORTHERN BIOSCIENCE
ECOLOGICAL CONSULTING

Executive Summary

This report describes a "rapid assessment" of wetlands within 500 m of proposed roads and transmission lines at the Wabagishik Hydroelectric project. A predictive model was used to identify those wetlands likely to be provincially significant. Wetlands in the study area are predominantly small areas of swamp and fen in bedrock depressions and shoreline wetland complexes. Three of the wetlands assessed were predicted to be provincially significant. Two wetlands will be crossed by proposed new roads or transmission lines (totalling 0.67 km) and four will be crossed by new transmission lines following existing roads (totalling 0.56 km).

Table of Contents

List of Figures

List of Tables

Introduction

The purpose of this report is to conduct a "rapid assessment" of wetlands within 500 m of proposed roads and transmission lines at the Wabagishik Hydroelectric project. A predictive model developed by the Ontario Ministry of Natural Resources (MNR) (Chisholm et al. 1995, Davies et al. 1996) was used to identify those wetlands likely to be provincially significant according to the Northern Ontario Wetland Evaluation System (OMNR 1993).

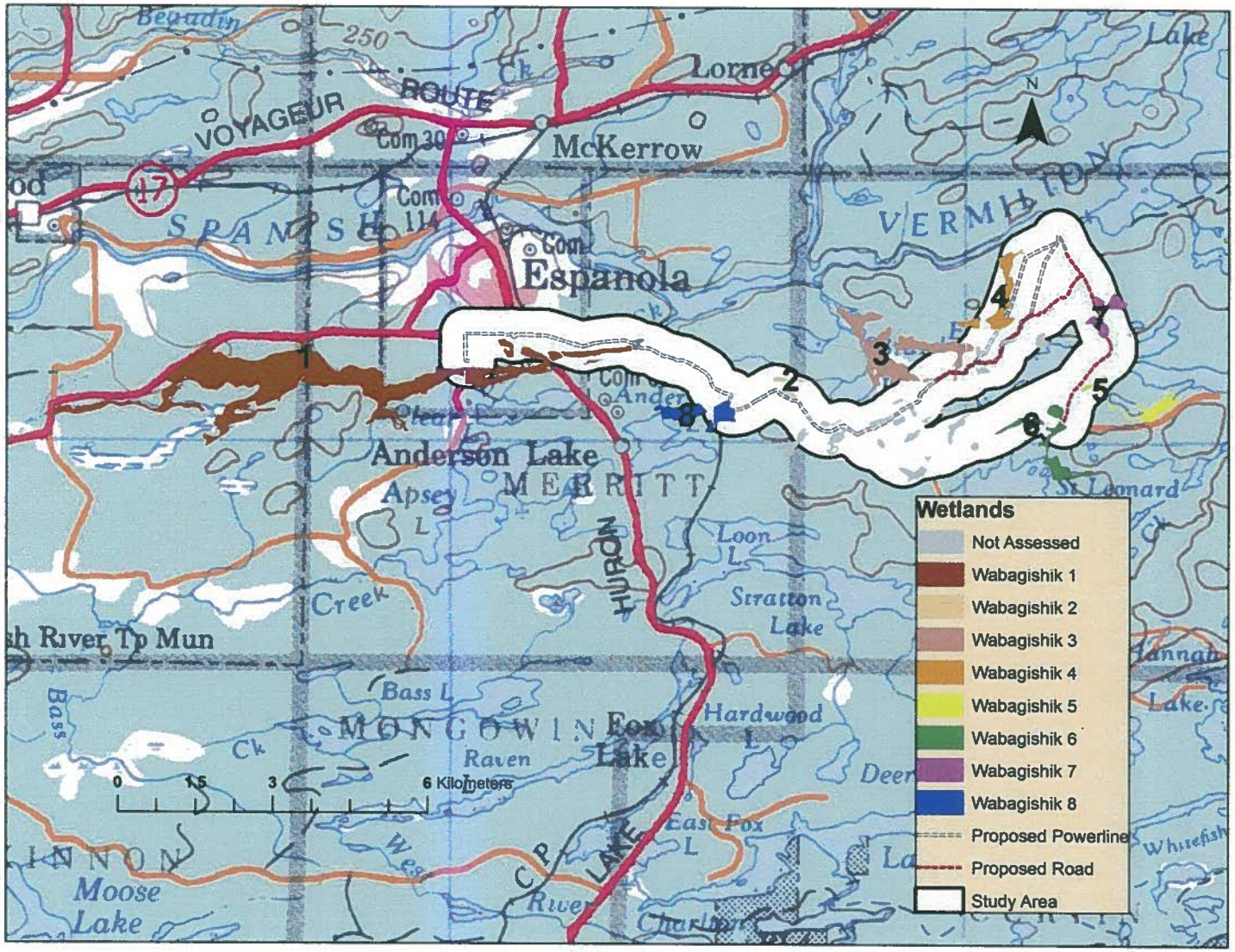


Figure 1. Wetlands in the Wabagishik study area.

Methods

The following methods were used to identify potentially significant wetlands within a 500 m buffer surrounding proposed roads and transmission lines associated with the Wabagishik hydroelectric project. This distance exceeds the 120 m "adjacent lands" buffer applied to provincially significant wetlands.

Wetlands were identified from the following data sources:

1. Forest Resource Inventory (FRI) wetland ecosites (Central Ontario Ecosites ES31 to ES35; Table 1) and non-forested wetlands (Brush, Open Muskeg and Treed Muskeg).
2. Land Information Ontario (LIO) wetland and wild rice data layers.
3. Ads40 Image Mosaics (MNR Enhanced FRI Imagery)
4. GoogleEarth imagery.

Polygons of contiguous wetland were amalgamated to determine wetland size following the wetland evaluation standards (OMNR 1993):

- In general, wetlands smaller than 2 ha and not part of a complex were not evaluated.
- Some non-contiguous wetlands were included in a "complex" where they were less than 0.75 km apart and within a single watershed.
- Small wetlands (less than about 1 ha) in bedrock basins lacking evident surface water connections were not included in a complex with other wetlands.

Table 1. Central Ontario Wetland Ecosites (Chambers et al. 1997).

Ecosite	Name
ES31	Black Spruce - Tamarack Very Moist to Wet
ES32	White Cedar - Black Spruce - Tamarack Very Moist to Wet
ES33	White Cedar - Other Conifer Very Moist to Wet
ES34	White Cedar - Lowland Hardwood Very Moist to Wet
ES35	Lowland Hardwood Fresh to Very Moist

The parameters needed to run the model (Wetland Size, Open Water Types, Landscape Aesthetics, Ownership, and Rarity (Wetland Type) were derived from the above data sources and were then entered into the Northern Ontario N1A model for predicting wetland score described in Chisolm et al. (1995) and Davies et al (1996):

Score = Constant+(RTOT1*1.939)+(SZ1LOG*38.248)+(AESTH*-12.879)+(OPWAT*3.062) +(OWNER*7.475)

Where:

Variable	Description	Component	Manual Section
RTOT1	Rarity (Wetland Type)	Special Features	4.1.1
SZ1LOG	Wetland Size (ha) - log transformed		
AESTH	Landscape Aesthetics (total) - includes Distinctness and Disturbance	Social	2.3
OPWAT	Open Water Types	Biological	1.2.6
OWNER	Ownership	Social	2.6

A wetland is considered provincially significant if the evaluation total score is at least 600 points or the Biological Component or Special Features score is 200 or more points (OMNR 1993).

Proposed roads and transmission lines were overlain on provincially significant wetlands polygons to estimate the length in or immediately adjacent to the wetland.

Results and Discussion

Wetlands in the study area are predominantly small pockets of marsh, fen and swamp in bedrock depressions, cedar swamps, and shoreline marsh / thicket swamp complexes.

Three of the nine wetlands assessed were predicted to be provincially significant (Figure 1 to 9, Table 2). Scores from the predictive model ranged from 523 to 742 points for various wetlands in the study area.

In total, 0.37 km of new road, 0.3 km of new transmission line (not along existing roads), and 0.56 km of new transmission line along existing roads are proposed within wetlands (Table 3). Table 3 highlights that only 0.18 km of transmission line along existing roads, 0 km of new roads and 0 km of new transmission line (not along existing roads) are within provincially significant wetlands.

Limitations

The predictive models explain 65-70% of the observed variation in total scores and do not eliminate the need to complete field evaluations for individual wetlands (Davies et al. 1996). In addition, the models do not identify wetlands that are provincially significant because they score 200 or more points on the either the Biological or Special Features Components (such as Species at Risk). Points for Biological Features are based on productivity, biodiversity, and size.

Both the Google Earth and the AD40 images showed some evident gaps in wetland coverage with small areas of wetlands that were missed in FRI and LIO. These were often beaver ponds that were created only after the original mapping.

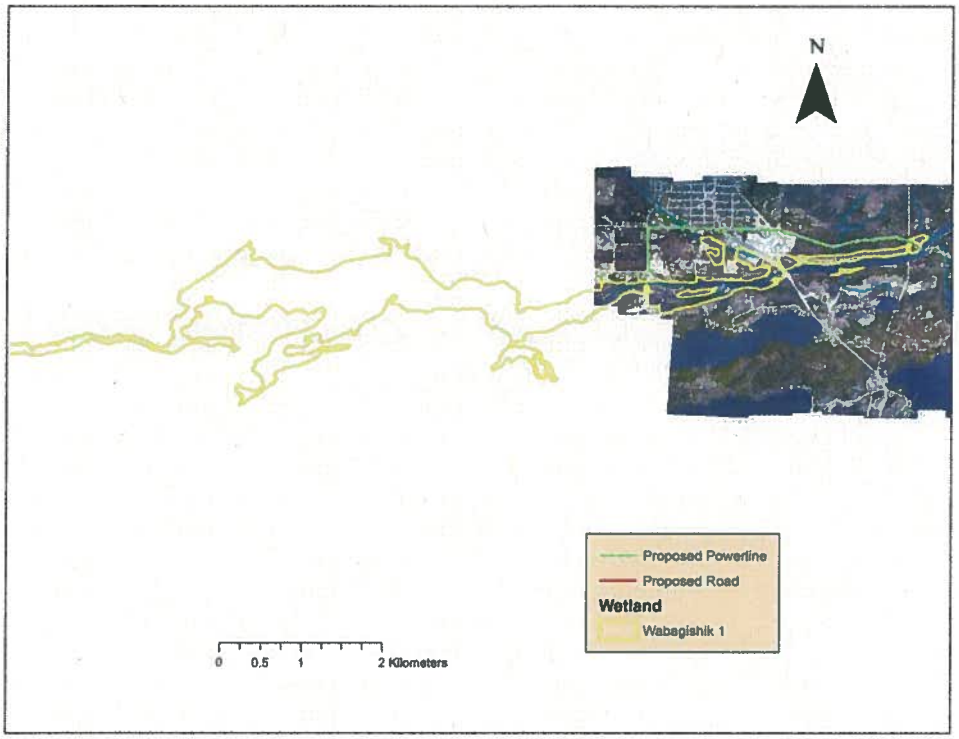


Figure 2. Wabagishik 1.

Figure 3. Wabagishik 2.

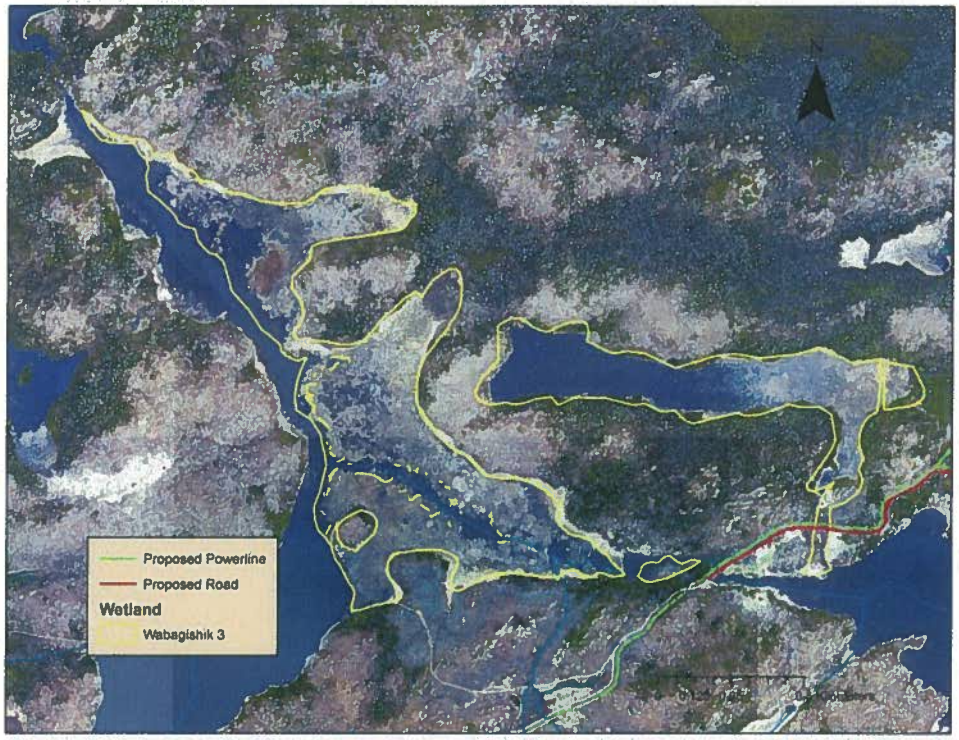


Figure 4. Wabagishik 3.

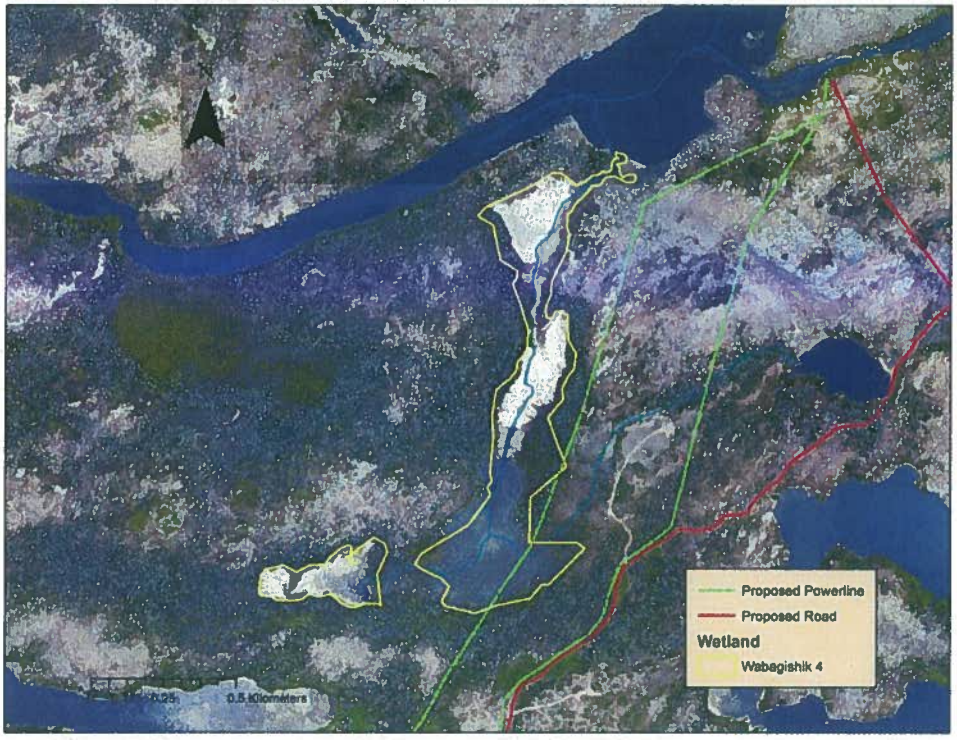


Figure 5. Wabagishik 4.

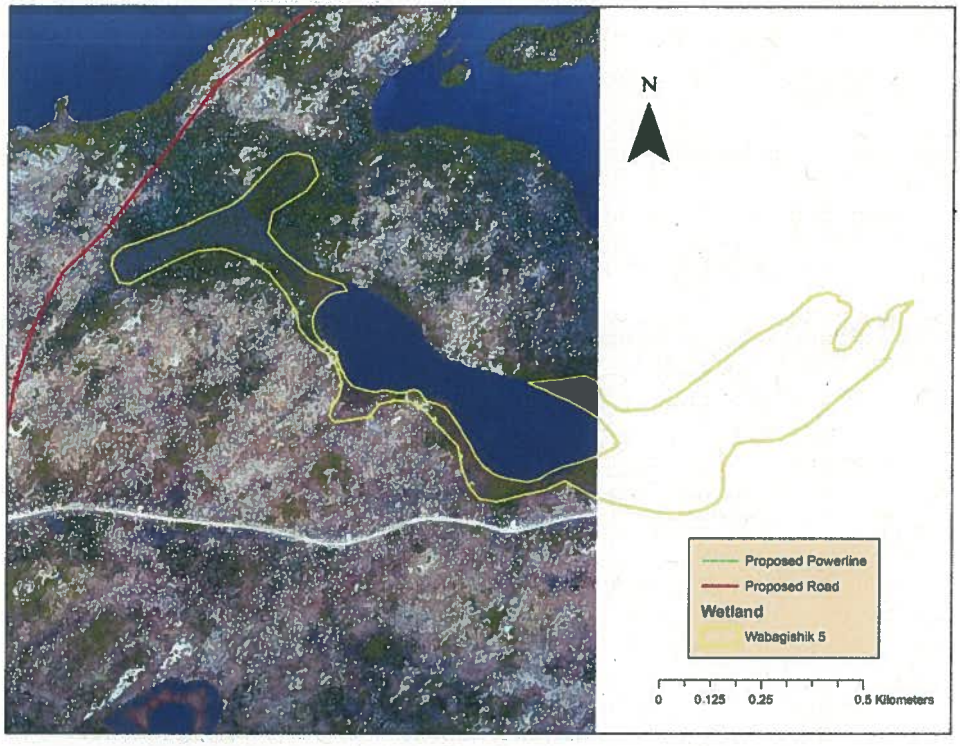


Figure 6. Wabagishik 5.

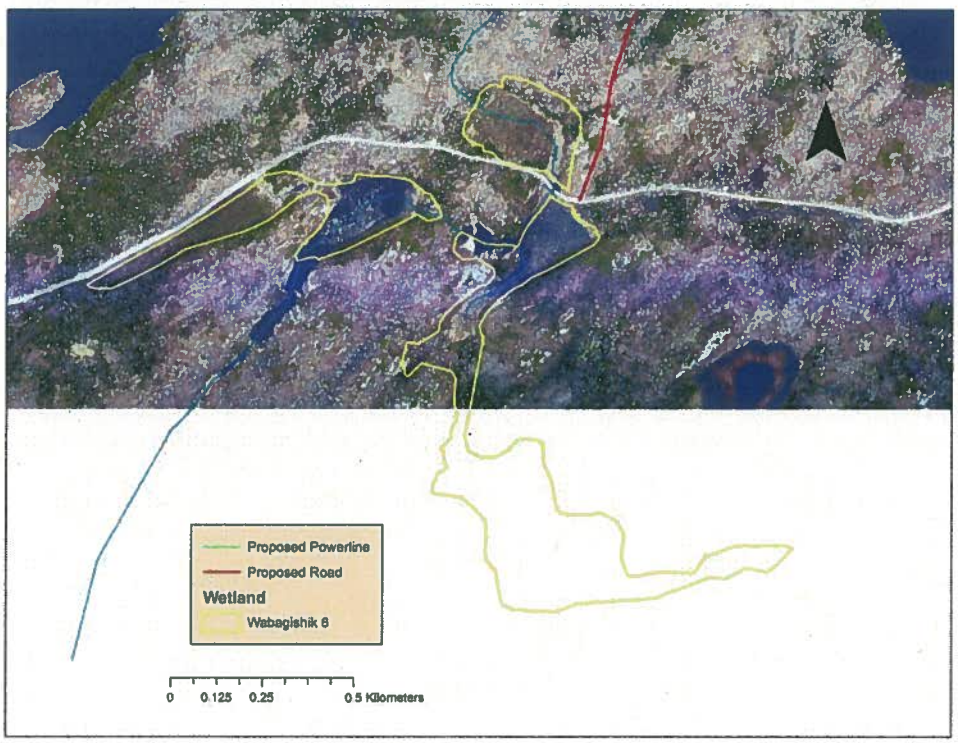


Figure 7. Wabagishik 6.

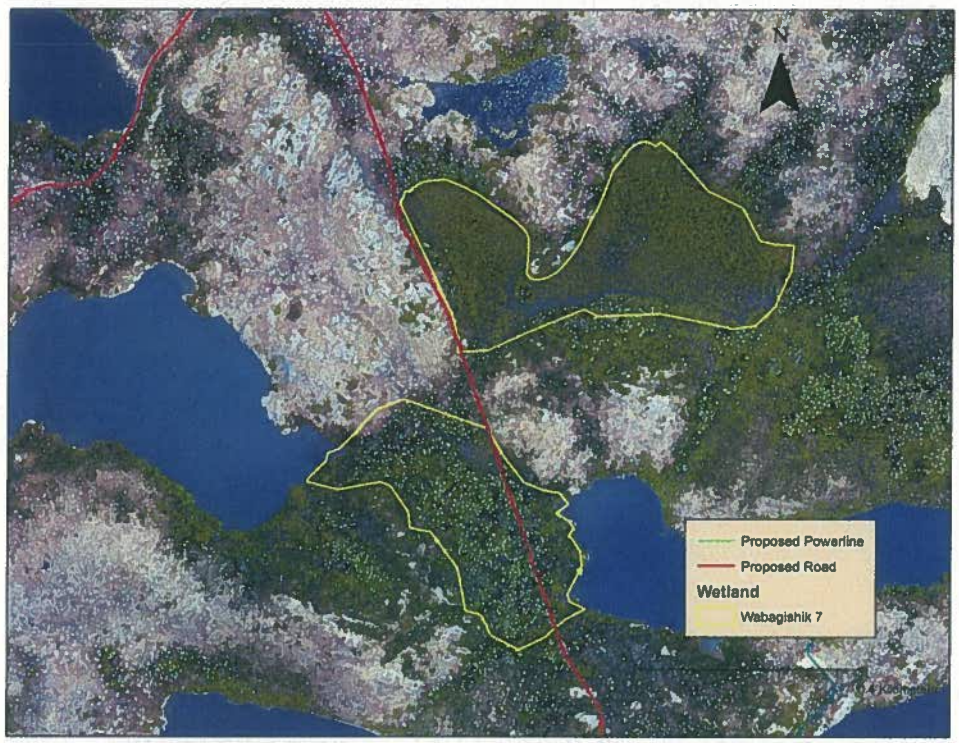


Figure 8. Wabagishik 7.

Figure 9. Wabagishik 8.

Table 2. Attributes and estimated evaluation scores for wetlands in the Wabagishik study area. See Figure 1 to 9 for locations.

Wetland #	Area (ha)	Bog	Fen	Swamp	Marsh	Rarity Score (RTOT1)	Landscape Aesthetics Score (AESTH)	Open Water Type Score (OPWAT)	Ownership Score (OWNER)	Score Model N1 A	Provincially Significant?
1	426.4		Y		Y	40	3	20	8	742	Y
2	7.0		Y	Y	Y	40	3	8	8	548	N
3	110.5				Y	10	3	14	8	614	Y
4	40.6				Y	10	3	8	8	557	N
5	29.2				Y	10	3	8	8	544	N
6	41		Y		Y	40	3	8	8	616	Y
7	19			Y		0	0	0	8	523	N
8	34.4			Y		0	0	0	8	546	N

Table 3. Roads and transmission lines within or along the edge of wetlands. See Figure 1 to 9 for locations.

Wetland #	New Road (km)	New Transmission Lines (km)	New Transmission Lines Along Existing Roads (km)	Provincially Significant?
1	0	0	0.13	Y
2	0	0	0.12	N
3	0	0	0.05	Y
4	0	0.30	0	N
5	0	0	0	N
6	0	0	0	Y
7	0.37	0	0	N
8	0	0	0.26	N
Total in PSW	**0**	**0**	**0.18**	

Impacts and Mitigation

The potential impacts of the proposed roads and transmission lines on wetland functions are described in Table 4.

For those sections of transmission line paralleling existing roads, no significant alterations to groundwater or surface water movement are expected to occur given the relatively small area involved and the fact that drainage patterns are already disrupted by existing ditches and fill. No highly sensitive wetland types such as rich, patterned fens are known to occur along any of the proposed routes.

Table 4. Potential impacts on wetland functions.

Potential Impact	Mitigation
General	• Transmission lines following existing roads should utilize the existing right of way. • Where possible, place the transmission line on the side of the road opposite the wetland
Diversion of water into or out of the wetland.	• Maintain the existing ditch channels to maintain the present water movement. Avoid making the ditches any deeper or wider
Loss of wetland vegetation along new road and transmission line.	• Restore and maintain low vegetation (low shrubs, graminoids) on the transmission line right of way. • Use passive revegetation through the existing seed bank where possible. • Replant trees where feasible, particularly Black Spruce and Tamarack
Compaction and rutting of peat during construction potentially leading to (i) alteration of surface water movement (ii) increased invasive plants.	• Use equipment and techniques to minimize compaction and rutting. • Winter construction on frozen ground will also reduce soil damage
Increases in invasive plant species.	• Rehabilitation should avoid the use of invasive plant species. Reed Canary Grass (*Phalaris arundinacea*) in particular should be avoided since it is highly invasive in northern Ontario wetlands. • Minimize soil rutting as described above

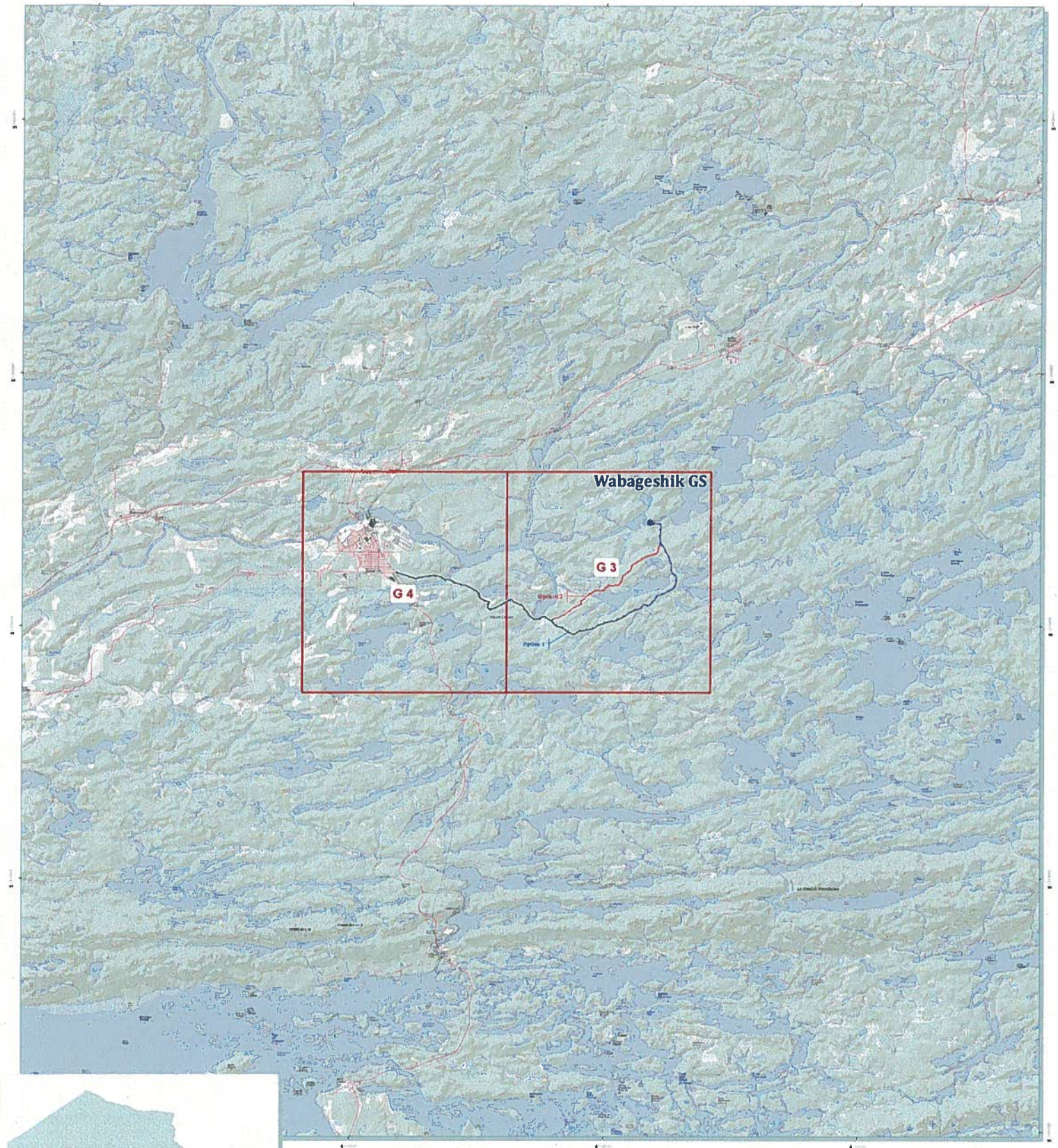
Literature Cited

Chambers, B.A., B.J. Naylor, J. Nieppola, B. Merchant, and P. Uhlig. 1997. Field Guide to the Forest Ecosystems of Central Ontario. Ont. Min. Natur. Resour. SCSS Field Guide FG-01.

Chisholm, S., J.C Davies., G. Mulamoottil, and D. Cappatos. 1995. Wetland evaluation in Ontario: Models for predicting wetland score. Ont. Min. Natur. Resour., Northeast Sci. & Technol. TR-025. 43 p.

Davies, J.C., S. Chisholm, G. Mulamoottil, J. Parton and D. Cappatos. 1996. Predicting wetland score: is it wet, is it significant. Ont. Min. Natur. Resour., Northeast Sci. & Technol. TN-015. 8 p.

Ontario Ministry of Natural Resources (OMNR). 1993. Ontario Wetland Evaluation System Northern Manual. Northeast Sci. & Technol. Technical Manual TM-001.



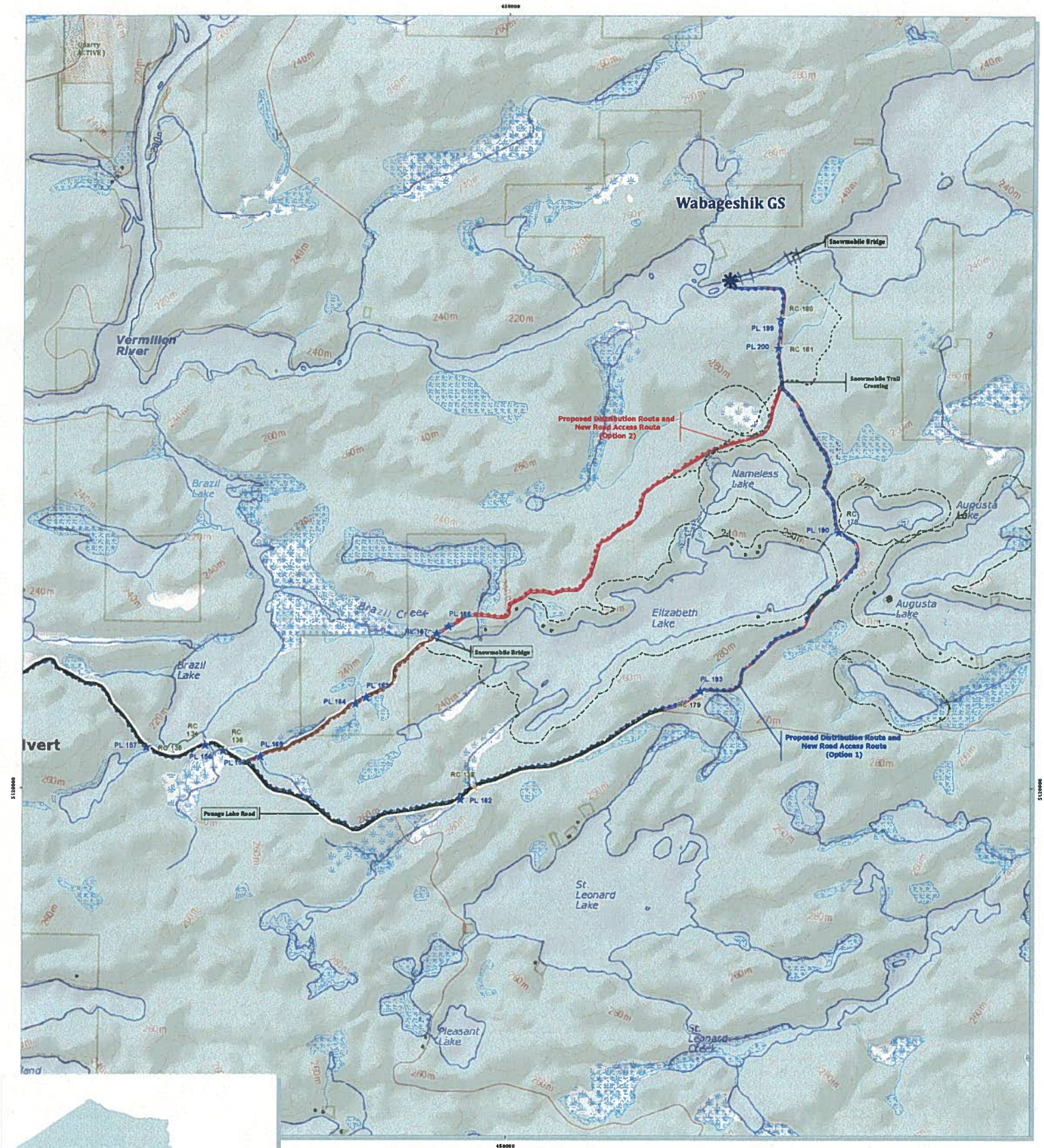
Reference data based on the Topo1ma 1: 50,000 scale topographic reformcor product developed by Natural Resources Canada (NRCan) and the Land Information Ontario data warehouse, Ontario Ministry of Natural Resources.
Map produced by KBM Resources Group, Thunder Bay Ontario (www.kbmrg.com).

Site Access and Powerline Route Index Map
Tile Set G1 (Vermillion River) Wabagishik Rapids

N

1 : 50,000

0 2.5 5
Kilometres

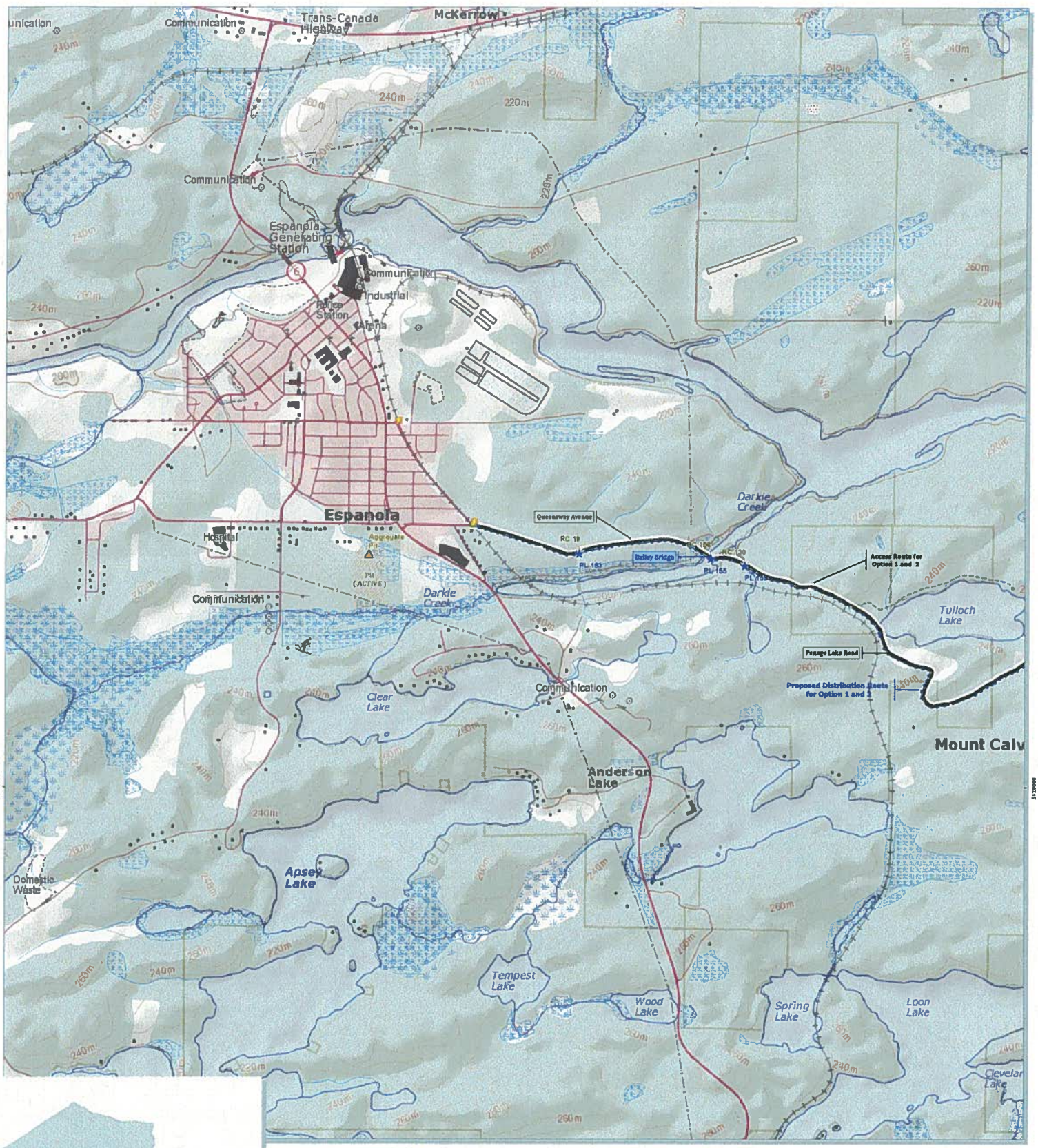


Reference data from the Land Information Ontario data warehouse, Ontario Ministry of Natural Resources. Digital Aerial Photography from KBM Resources Group, Thunder Bay Ontario (www.kbmrg.com).

Map Created: July 15, 2013
Version Date: June 13, 2013
Version Number: 2.5

Lines and Roads Map - Vermillion River (Wabagishik Rapids) Tile G 3

- Dam Site
- Powerline Water Crossing
- Access Road Water Crossing
- Proposed Powerline
- Proposed Alternate Powerline
- Access Route (Primary Road)
- Access Route (Secondary Road)
- Access Route (Tertiary Road)
- Access Route (New Access Road)
- Existing Trail
- Exclusion Zone Boundary (90m buffer)
- Private Land
- Wetland_Type
- Aggregate Site



1:10,000

0 0.5 1 2
Kilometers

Reference data from the Land Information Ontario data warehouse, Ontario Ministry of Natural Resources. Digital Aerial Photography from KBM Resources Group, Thunder Bay Ontario (www.kbmrg.com).

Map Created: July 15, 2013
Version Date: June 13, 2013
Version Number: 2.5

Lines and Roads Map - Vermillion River (Wabagishik Rapids) Tile G 4

- Dam Site
- Point of Common Coupling (PCC)
- Powerline Water Crossing
- Access Road Water Crossing
- Proposed Powerline
- Access Route (Primary Road)
- Access Route (Secondary Road)
- Access Route (Tertiary Road)
- Access Route (New Access Road)
- Private Land
- Wetland_Type
- Aggregate Site