

Ontario Ministry of Transportation

**Highway 17 Planning & Class EA Study
Fisheries Report
GWP 5670-10-00**

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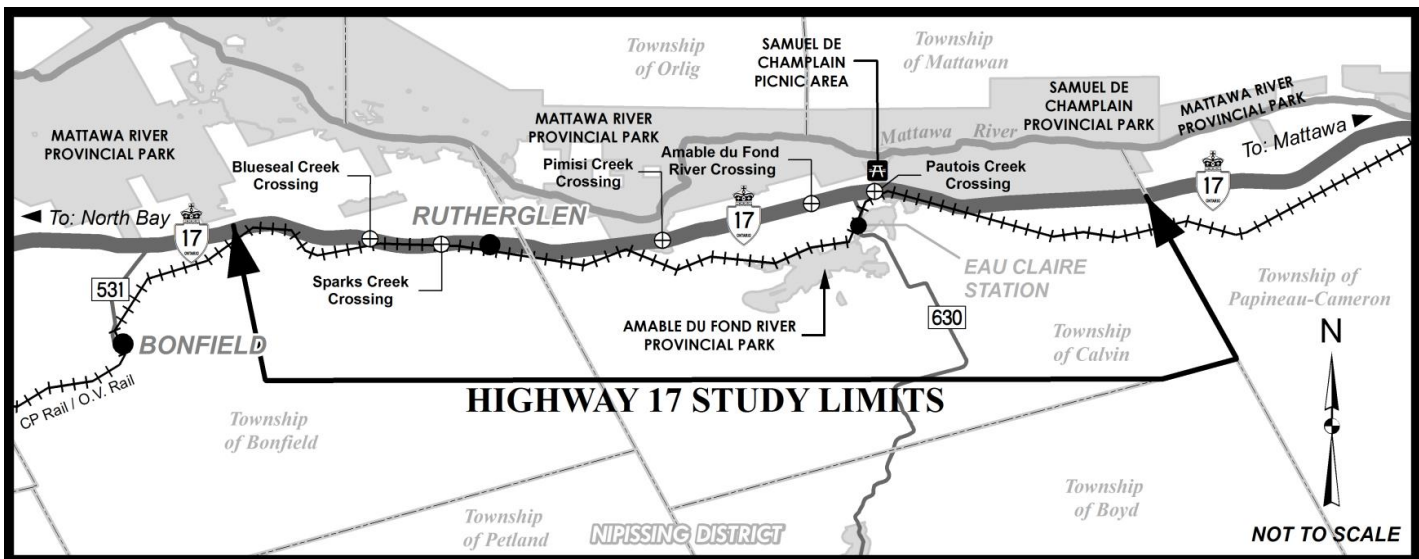
Appendices

- Appendix A. Agency correspondence
- Appendix B. AECOM Site Selection and Field Data Sheets
- Appendix C. Existing Fish and Fish Habitat Conditions Summary Table

1. Introduction

The Ontario Ministry of Transportation has retained AECOM to undertake a Class Environmental Assessment to identify a recommended plan for a four-lane Highway 17 within the study limits with access restricted to interchange locations. The study limits are shown in **Figure 1.1** below and involves a 23.5 km section of Highway 17 from Bonfield easterly to the boundary road between the Townships of Calvin and Papineau-Cameron.

Figure 1.1: Class EA Study Limits



Within the study area, Highway 17 is primarily a two lane highway with limited access restrictions and access in both directions provided via private driveways and local roadways. This planning, preliminary design and Class EA study has been completed to identify a preferred plan for Highway 17 to improve future traffic operations and to enhance highway safety from Bonfield to the boundary road of Calvin Township and the Township of Papineau-Cameron.

As outlined in the Study Design Report (AECOM 2012) for this project, the study involved the development and evaluation of a range of alternatives which could address the transportation needs of the study area. Specifically, the alternatives considered included:

- widened/improved provincial highway;
- realigned provincial highway; and
- combinations of the above.

Highway planning alternatives were generated with a freeway cross section comprised of two lanes in each direction, a 30m median within a total right-of-way width of 110m, and access restricted to interchanges. Consideration was given to the environmental constraints within the Study Area are shown on **Figure 1.2**.

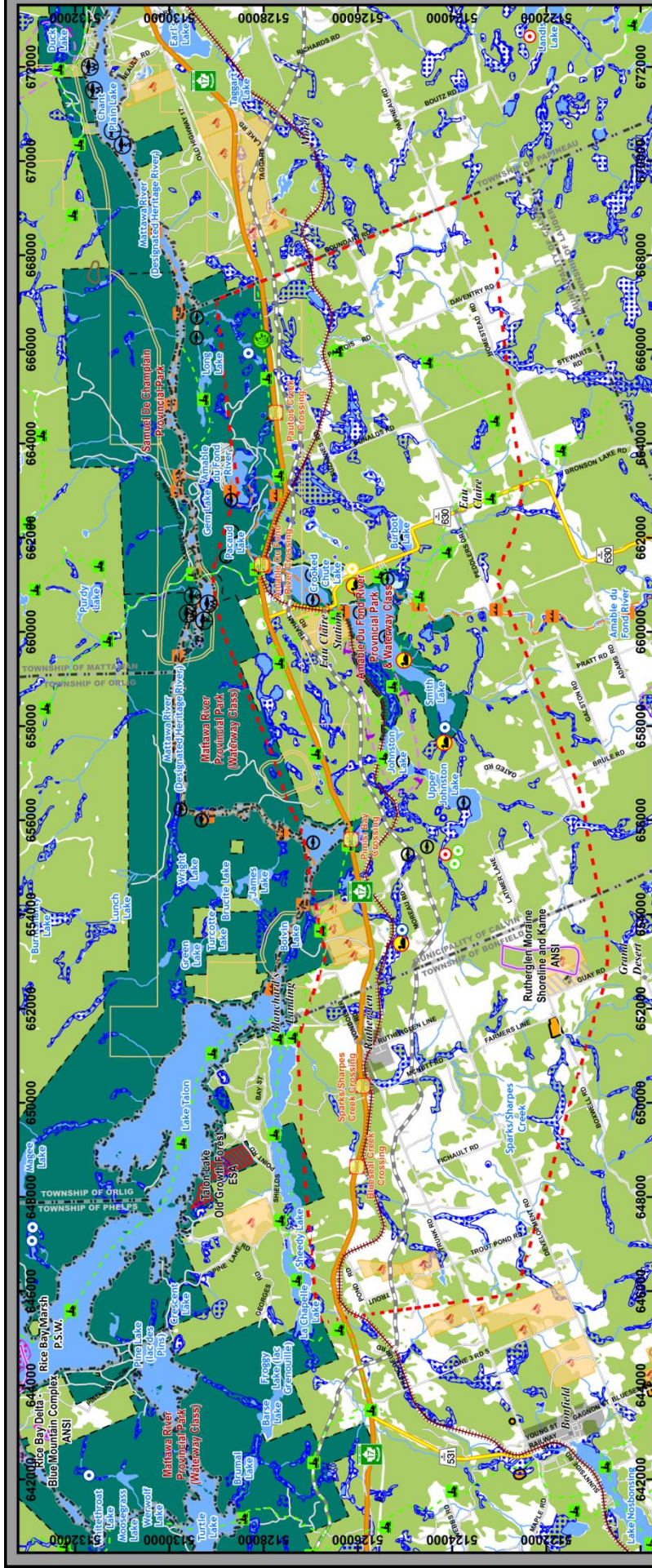
The highway planning alternatives included segments of widening and/or improving the existing highway and segments of realigned highway, with interchanges at key connection points and new service roads for some areas. In the Rutherglen and Amable du Fond areas, widening of the existing highway is not possible due to physical constraints and environmental conditions. Therefore, realignment alternatives were generated for these two areas while widening alternatives were generated for the Pimisi Bay and Pautois Creek areas. The evaluation of highway planning alternatives was completed on a comparative basis for each of the four highway realignment and widening

alternative areas (with associated interchanges and service roads) and a recommended plan was identified in January 2014 as shown on **Figure 1.3**.

Waterbodies are one of the significant natural features within the study area. A total of twenty-one (21) waterbody / watercourse crossings were identified as potentially impacted by the recommended plan and associated construction activities. This report provides a description of the existing fish habitat within the Highway 17 study area through background data collection and field investigations conducted by AECOM in 2013. An outline of the environmental constraints, potential impacts and potential enhancement or compensation measures is also provided in this report.

This fisheries report is submitted concurrently with the *Highway 17 Planning and Class EA Study, Terrestrial Ecosystems Report*.

Figure 1.2: Environmental Constraints Mapping



LEGEND

- Municipal Boundary
- Waterbody
- Settlement or Developed Area
- Undeveloped Area
- Provincial Parks
- Inactive Aggregate Site
- Active Aggregate Site
- High Avoidance Plant
- Watercourse Crossings

Provincially Identified Spawning Areas

- Municipally Identified Bird Nesting Site
- Municipally Identified Bird Concentration Area
- Muskellunge
- Pike
- Small Mouth Bass
- Walleye
- Other

Highway 17 Study Area

- Study Area
- Highway
- Arterial
- Collector
- Local
- Railway
- Canoe Path
- Snowmobile Trail
- Trans Canada Pipeline

Provincially Identified Bird Nesting Sites

- Barred Owl
- Broadwing Hawk
- Common Raven
- Great Blue Heron
- Merlin
- Northern Goshawk
- Osprey
- Red-Shouldered Hawk
- Red Tailed Hawk
- Unknown Raptor

Highway 17

Environmental Assessment

7/23/2012

Project #: 6024.1599

AECOM

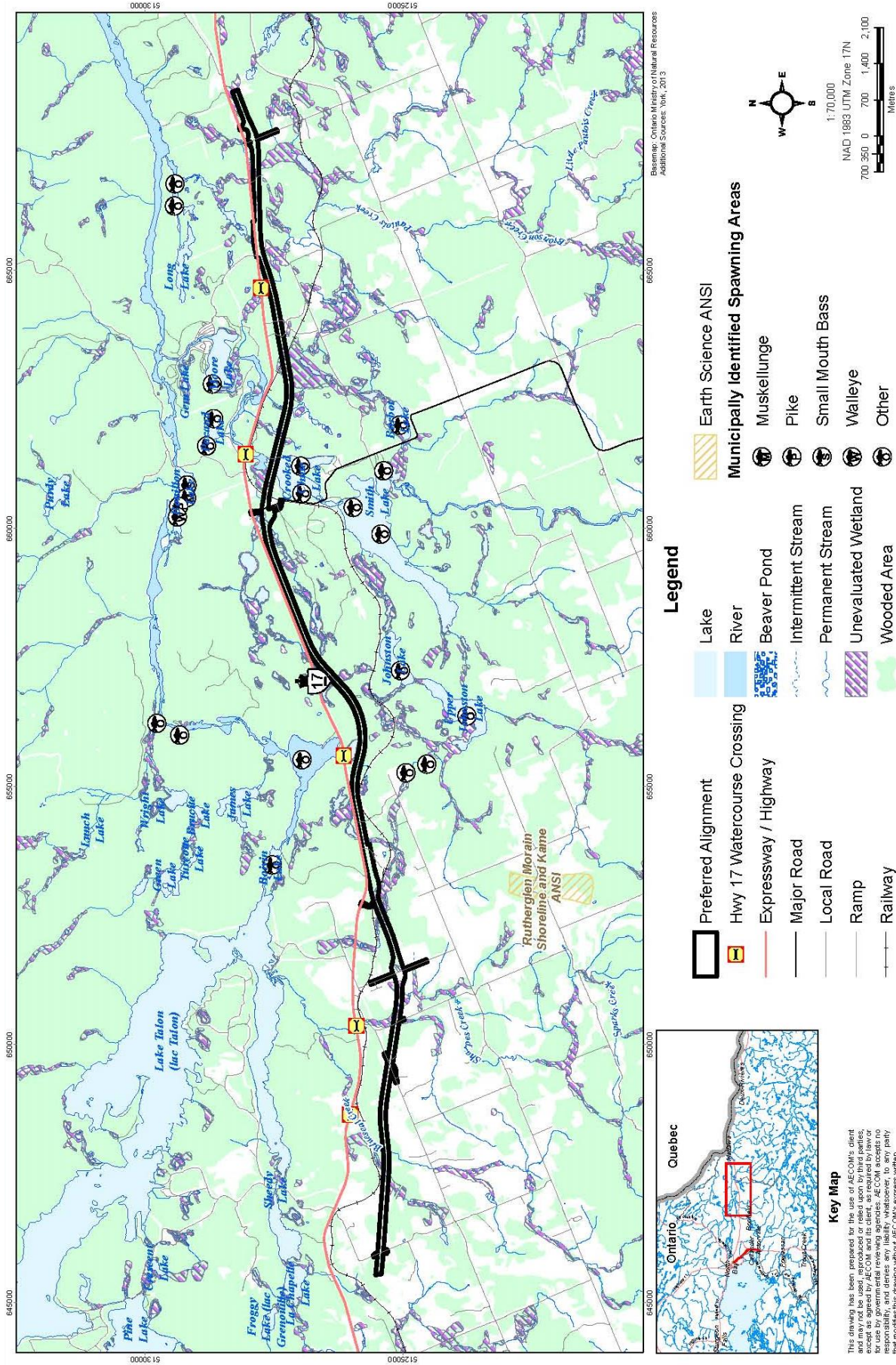
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NAD 1983 UTM Zone 17N

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Figure 1.3: Recommended Plan and Environmental Constraints



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2. Background Data

Pertinent information on the fish community and fish habitat within the study area was obtained through review of secondary source material including:

- Township of Bonfield Official Plan (2012);
- East Nipissing Official Plan (2010);
- Correspondence with the Ministry of Natural Resources (MNR) – North Bay District Office;
- MNR Natural Heritage Information Centre (NHIC) Biodiversity Explorer online database;
- MNR Species at Risk (SAR) online regional database;
- Correspondence with the North Bay Conservation Authority (NBCA);
- Correspondence with Department of Fisheries and Oceans (DFO);
- DFO online Species at Risk mapping tool;
- Highway 17 Planning Study From 2.2 km east of Highway 531 easterly to 8.0 km east of Highway 630, (GWP 5670-10-00) Summary of Existing Environmental Conditions and Constraints Report (AECOM, March 2013); and
- Aerial photography.

2.1 Official Plans

The study area includes multiple townships and districts but all fall under the East Nipissing Official Plan (2010) or the Bonfield Official Plan (2012). The East Nipissing Official Plan includes the Township of Calvin, Township of Mattawa and Papineau-Cameron in the District of Nipissing. The Bonfield Official Plan includes the Township of Bonfield and the Hamlets of Bonfield and Rutherglen.

Guidance on identified Natural Heritage features is provided in the official plans. Any proposed private development within 120m of fish habitat requires an impact assessment be completed with permitting for development and / or disturbance of fish habitat deferred to the applicable provincial and federal authorities. Further details on the impact assessment requirements of each Official Plan can be found in Section 7.5, and Schedules A1-A3 (East Nipissing Official Plan) and Section 5.1.3, and Schedule B (Bonfield Official Plan).

2.2 Ministry of Natural Resources

The main waterbodies in the study area were initially identified in the Existing Environmental Conditions and Constraints Report (AECOM, March 2013) and were listed as Blueseal Creek, Sparkes (Sharpes) Creek, Mattawa River and Pimisi Bay, Amable du Fond River, and Pautois Creek. Additional background information on these waterbodies was obtained from the North Bay MNR office and the online MNR database tools (i.e., Biodiversity Explorer and SAR regional database) and is presented in this report. Information requested from the MNR included:

- Fish species list and locations;
- Thermal regimes for watercourses;
- Timing for in-water work restrictions;
- Known spawning areas; and
- Species at Risk – species and locations.

Personal correspondence with Julie Robinson, MNR District Planner on January 20, June 18 and June 20, 2012 provided information with respect to watercourses and fisheries.

Blueseal Creek, Sharpes Creek and Pautois Creek are all designated as coldwater systems that have Brook Trout (*Salvelinus fontinalis*), and have in-water work restrictions of September 15th to April 1st. Amable du Fond River and Mattawa River / Pimisi Bay are designated as warmwater systems with in-water work restrictions between April 1st and July 15th. Amable du Fond River has Brook Trout, Smallmouth Bass (*Micropterus dolomieu*), and Walleye (*Sander vitreus*).

Table 2.1 below provides a summary of fisheries information provided by the MNR (note a full fish species list was not provided by MNR):

Table 2.1: Summary of MNR Fisheries Information

Waterbody Names	Sub-Watershed	Thermal Regime	Fish Species Present	In-water Work Restriction
Blueseal Creek	Sharpes Creek	Coldwater	Brook Trout	No in-water work between September 15 and April 1
Sparkes (Sharpes) Creek	Sharpes Creek	Coldwater	Brook Trout	No in-water work between September 15 and April 1
Mattawa River and Pimisi Bay	Mattawa River	Warmwater		No in-water work between April 1 and July 14
Amable du Fond River	Amable du Fond River	Warmwater	<ul style="list-style-type: none"> • Brook Trout • Smallmouth Bass • Walleye 	No in-water work between September 15 and July 15
Pautois Creek	Pautois Creek	Coldwater	Brook Trout	No in-water work between September 15 and April 1

Note: Mattawa River and Pimisi Bay are locations available to all fish species present within Mattawa River

Thermal regimes can help determine the fish community found within the waterbody as described below:

- Coldwater – Fish community comprised primarily of fish species intolerant of water temperature that exceed 22°C in the summer and are usually found only in groundwater rich areas.
- Coolwater – Fish community comprised of species that can tolerate more variable water temperatures and conditions. This will include species that are coolwater tolerant and some salmonids that can tolerate maximum summer water temperatures up to 24°C for brief periods of time. These communities are often found where occasional groundwater discharges occur.
- Warmwater – Fish community comprised of species that are highly tolerant of wide temperatures and flow fluctuations, and can withstand water temperatures in excess of 26°C for prolonged periods of time.

Species at risk information was obtained from the online MNR databases (Biodiversity Explorer and SAR regional database) as well as correspondence with Julie Robinson, MNR District Planner June 18, 2012 (correspondence found in Appendix A). Three fish species have been identified as known to occur in the area: Lake Sturgeon (*Acipenser fulvescens*), Shortjaw Cisco (*Coregonus zenithicus*) and Northern Brook Lamprey (*Ichthyomyzon fossor*). **Table 2.2** below provides information about confirmed and potential fish species at risk in the study area. Of note, the Aurora Trout (*Salvelinus fontinalis timagamiensis*) was identified in the AECOM Summary of Existing Environmental Conditions and Constraints Report (March 2013) however, for this report the study area focuses on the watercourses and areas up and down stream of crossings of the waterways impacted by the recommended plan. The Aurora Trout species is not a concern with respect to the recommended plan.

Table 2.2: Summary of MNR Species at Risk Information

Species	ESA Status	SARA Status	COSEWIC Status	Preferred Habitat ^{1, 2}	Source Identifying Species Record	Habitat Present within the Study Area?
Lake Sturgeon (Great Lakes-Upper St. Lawrence River population)	THR	No Status	THR	The Lake Sturgeon lives almost exclusively in freshwater lakes and rivers with soft bottoms of mud, sand or gravel. They are usually found at depths of five to 20 metres. They spawn in relatively shallow, fast-flowing water (usually below waterfalls, rapids, or dams) over hard-pan clay, sand, gravel and boulders at the bottom. However, they will spawn in deeper water where habitat is available. They also are known to spawn on open shoals in large rivers with strong currents.	Nippising Region Species at Risk - Ministry of Natural Resources Species at Risk Website Correspondence with North Bay District MNR	Yes - potential
Shortjaw Cisco	THR	THR Schedule 2	THR	The Shortjaw Cisco spends most of the year in deep water, usually between 55 to 180 metres in depth. During the breeding season, which can be spring or fall depending on the lake, it migrates to shallower water (10 to 60 metres) to mate and lay eggs. It feeds on tiny aquatic animals, called zooplankton, but also eats aquatic insects, crustaceans, and freshwater shrimp.	Nippising Region Species at Risk - Ministry of Natural Resources Species at Risk Website	No, Not likely
Northern Brook Lamprey	SC	SC Schedule 1	SC	The Northern Brook Lamprey inhabits clear, coolwater streams. The larval stage requires soft substrates such as silt and sand for burrowing which are often found in the slow-moving portions of a stream. Adults are found in areas associated with spawning, including fast flowing riffles comprised of rock or gravel. Spawning occurs in May and June. The males construct small, often inconspicuous, nests by picking up pebbles with their mouths and moving them to form the rims of shallow depressions. The sticky eggs are deposited in the nest and adhere to the substrate.	Nippising Region Species at Risk - Ministry of Natural Resources Species at Risk Website	Yes - potential

Glossary

SARA Species at Risk Act (Federal)

ESA Endangered Species Act

COSEWIC Committee on the Status of Endangered Wildlife in Canada - a committee of experts that assesses and designates which wild species are in some danger of disappearing from Canada.

THR ESA - Threatened - a species that is at risk of becoming endangered in Ontario if limiting factors are not reversed.

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

Schedule 1 ESA - Special Concern (formerly Vulnerable) - a species with characteristics that make it sensitive to human activities or natural events.

Schedule 2 SARA - Special Concern - a wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.

References The official list of species that are classified as extirpated, endangered, threatened, and of special concern.

1 Species listed in Schedule 2 are species that had been designated as endangered or threatened, and have yet to be re-assessed by COSEWIC using revised criteria. Once these species have been re-assessed, they may be considered for inclusion in Schedule 1.

1 - Species at Risk . Ontario Ministry of Natural Resources. <http://www.mnr.gov.on.ca/en/Business/Species/index.html>. © Queens Printer For Ontario, 2013.

2 - Species at Risk Status Reports. Committed on the Status of Endangered Wildlife in Canada. Ottawa. http://www.sararegistry.gc.ca/search/advSearchResults_e.cfm?stype=doc&docID=18.

2.3 North Bay Conservation Authority

Background information was requested from the NBCA for the identified watercourses Blueseal Creek, Sparkes (Sharpes) Creek, Mattawa River and Pimisi Bay, Amable du Fond River, and Pautois Creek for the following information:

- Fish community;
- Known spawning locations;
- Timing restriction information;
- Species at Risk.

Through personal email correspondence with Paula Scott, NBCA Director on April 27, 2012 (**Appendix A**), hydrological data was provided including drainage areas and peak flows however no fisheries information was provided as NBCA records were limited. NBCA suggested contacting the North Bay MNR office for further natural heritage data and specifically for fisheries data in the impacted watercourses.

2.4 Department of Fisheries and Oceans

An email request was sent on November 11, 2013 to the DFO Fisheries Protection department which handles SAR information requests. On November 20, 2013 Emily Morton of the DFO replied stating there was no further information on the area beyond the DFO Species at Risk 2013 mapping.

Despite the MNR information presented in Section 2.2, a review of the North Bay Mattawa DFO Species at Risk 2013 mapping indicated there were no known species at risk to occur within the study area.

3. Field Investigations

Field investigations were completed in 2013 to document existing fish habitat conditions found within the footprint of the recommended plan for Highway 17 route, and to identify any potentially significant features. At the time of investigation only habitat features were assessed; fish community sampling is anticipated to be completed during the detailed design stage to support permitting for the proposed crossings. Field investigations to assess fish habitat were conducted September 16 – 19, 2013 by AECOM aquatic biologists. Background review and the initial surveys detailed in this report indicate that conditions in this rural area have remained relatively consistent since initial records were generated. Conditions are not anticipated to change significantly in this area but additional surveying is required and should be undertaken during future detail design phases of work. Future surveys should be completed at the locations detailed below and, where possible and necessary, at additional locations within the right of way for the recommended plan where access could not be obtained as part of this study.

3.1 Methods

Site selection was completed by overlaying waterbodies mapping and the alignment for the recommended plan for Highway 17 to determine where the two layers overlapped. All waterbodies that intersected the recommended plan were identified as locations for habitat investigations. A total of 21 crossings were identified, however, due to access restrictions imposed by private property owners, only 14 sites could be investigated, three of which were conducted from the roadside. Fish habitat assessments were completed at these 14 sites in an area that encompassed 110 m,

the approximate width of the recommended plan. Site locations, both unevaluated and assessed, are listed in **Table 3.1-1** below and are shown on **Figures 3.1 to 3.4**.

Table 3.1: Identified Waterbody Crossings

	Site Identification	Associated Station Number	Easting	Northing
Crossings evaluated by AECOM in 2013	A1	15+786	647926	5125319
	A2	18+286	650399	5125133
	A3	19+382	651532	5124768
	A4	22+049	653971	5125764
	A5	23+535	655439	5125860
	A6	25+216	657062	5126301
	A7	25+505	657245	5126540
	A8	28+885	660394	5127699
	A9	29+807	661306	5127492
	A10	30+288	661767	5127363
	A11	31+902	663354	5127299
	A12	33+449	664784	5127574
	A13	35+490	666869	5127860
	A14	36+132	667666	5127539
Crossings not evaluated due to access restrictions imposed by private property owners	IA1	15+329	647510	5125332
	IA2	18+596	650793	5125075
	IA3	20+401	652383	5125351
	IA4	20+749	652686	5125442
	IA5	22+939	654847	5125920
	IA6	28+632	660145	5127650
	IA7	31+902	664003	5127364

Figure 3.1: Aquatic Habitat Survey Sites

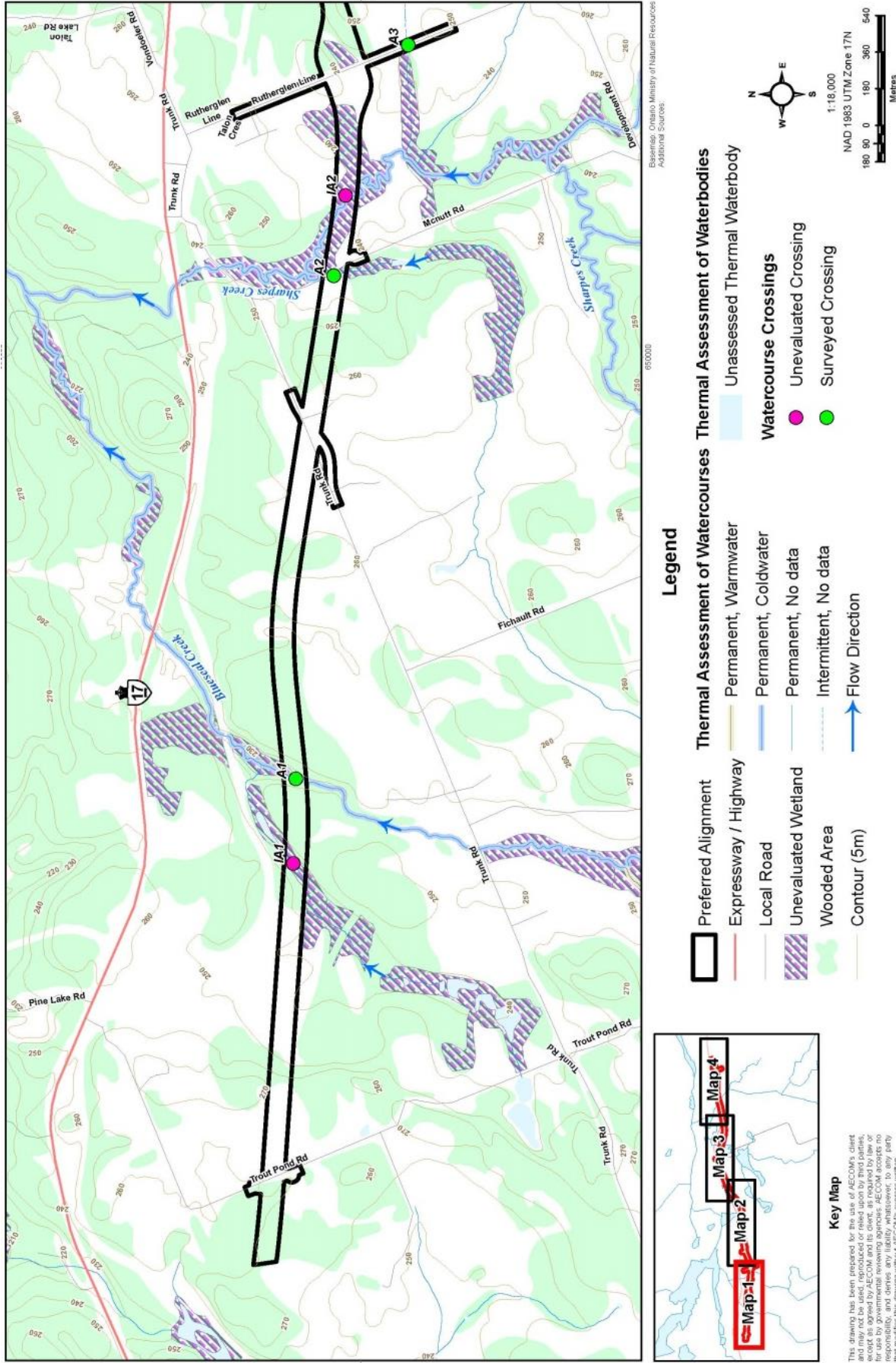


Figure 3.2: Aquatic Habitat Survey Sites

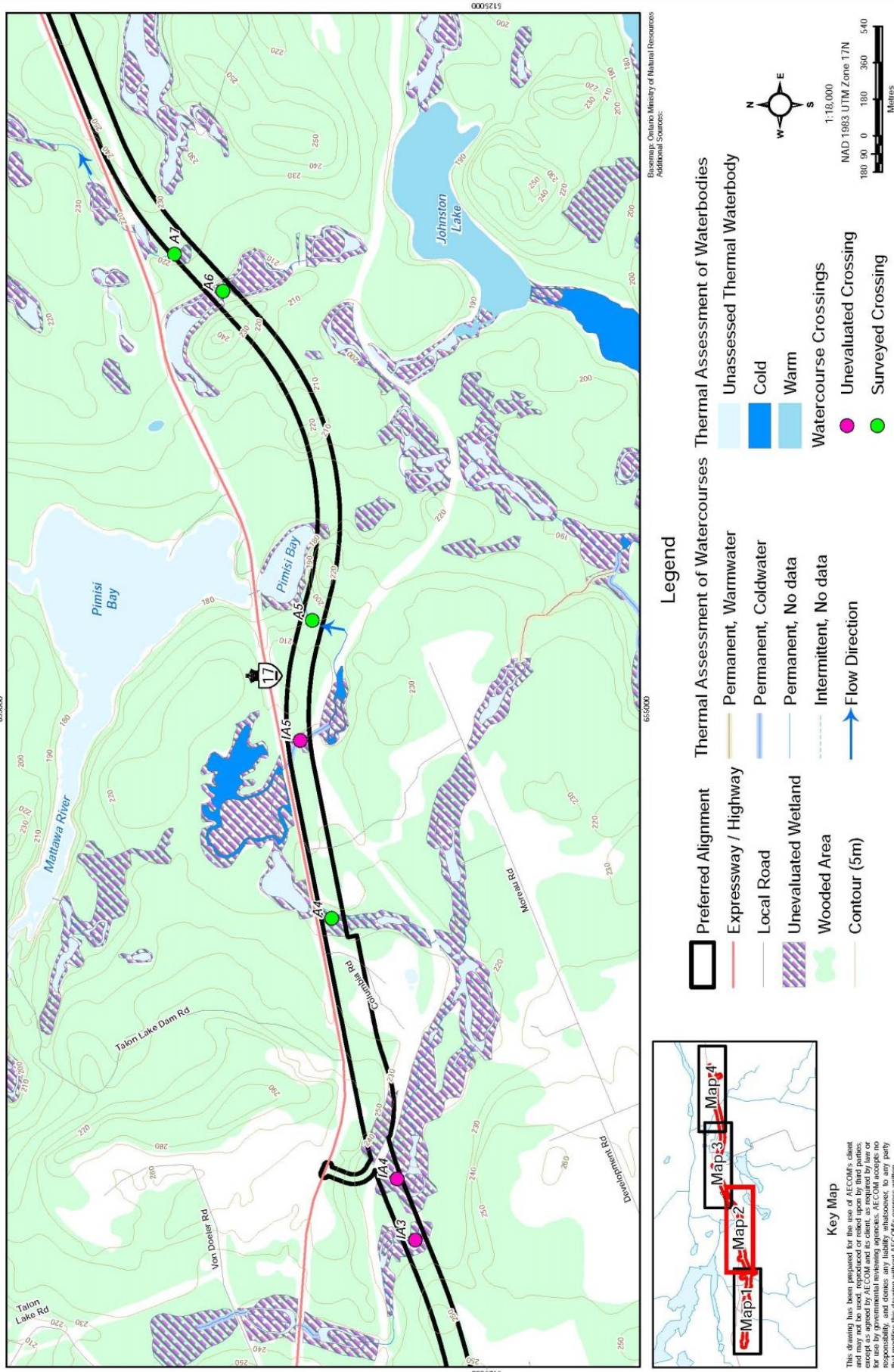
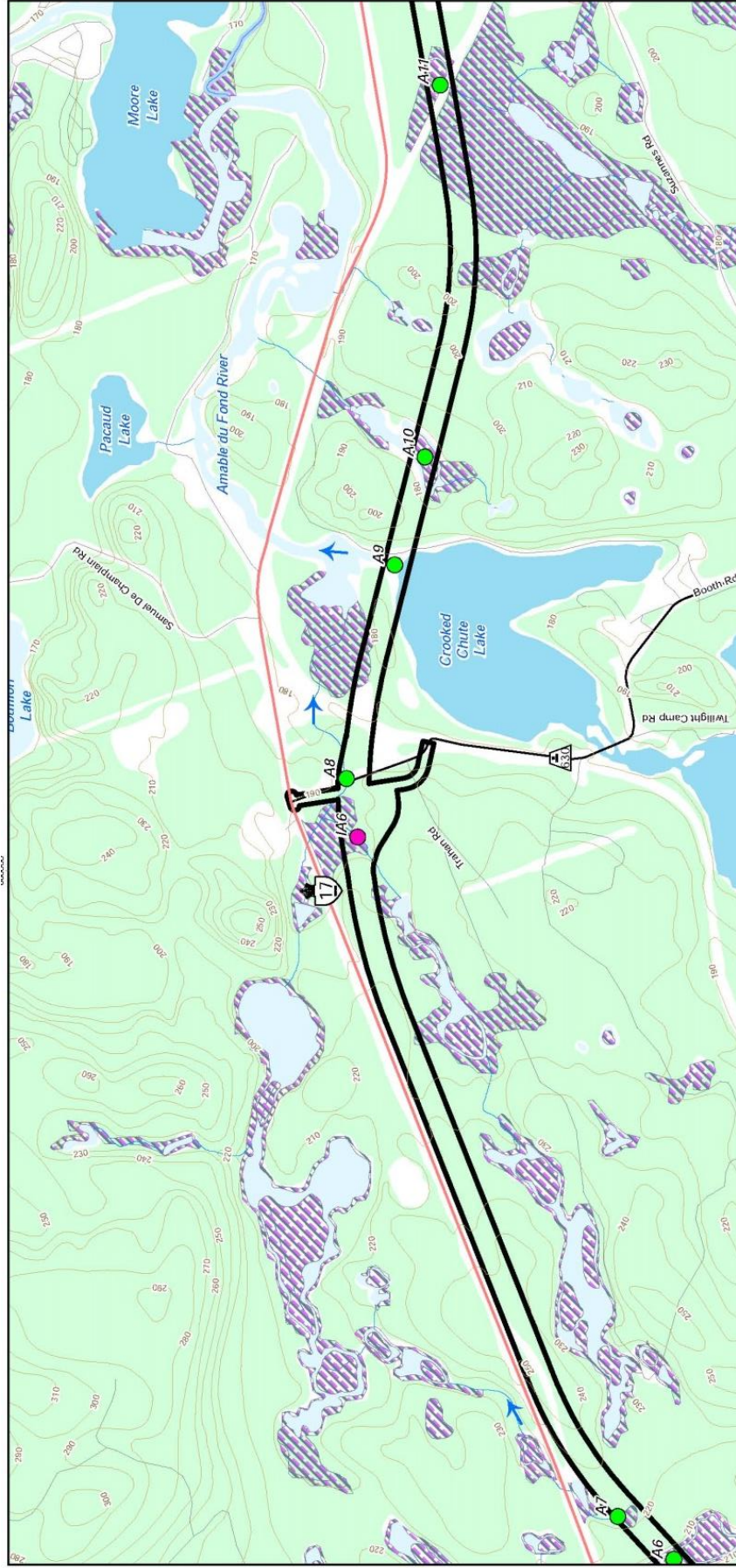
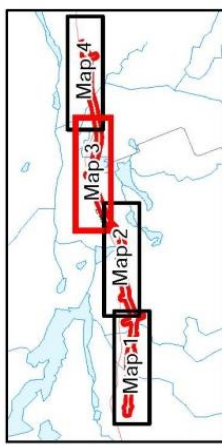


Figure 3.3: Aquatic Habitat Survey Sites



Revising: Ontario Ministry of Natural Resources
 Additional Sources:



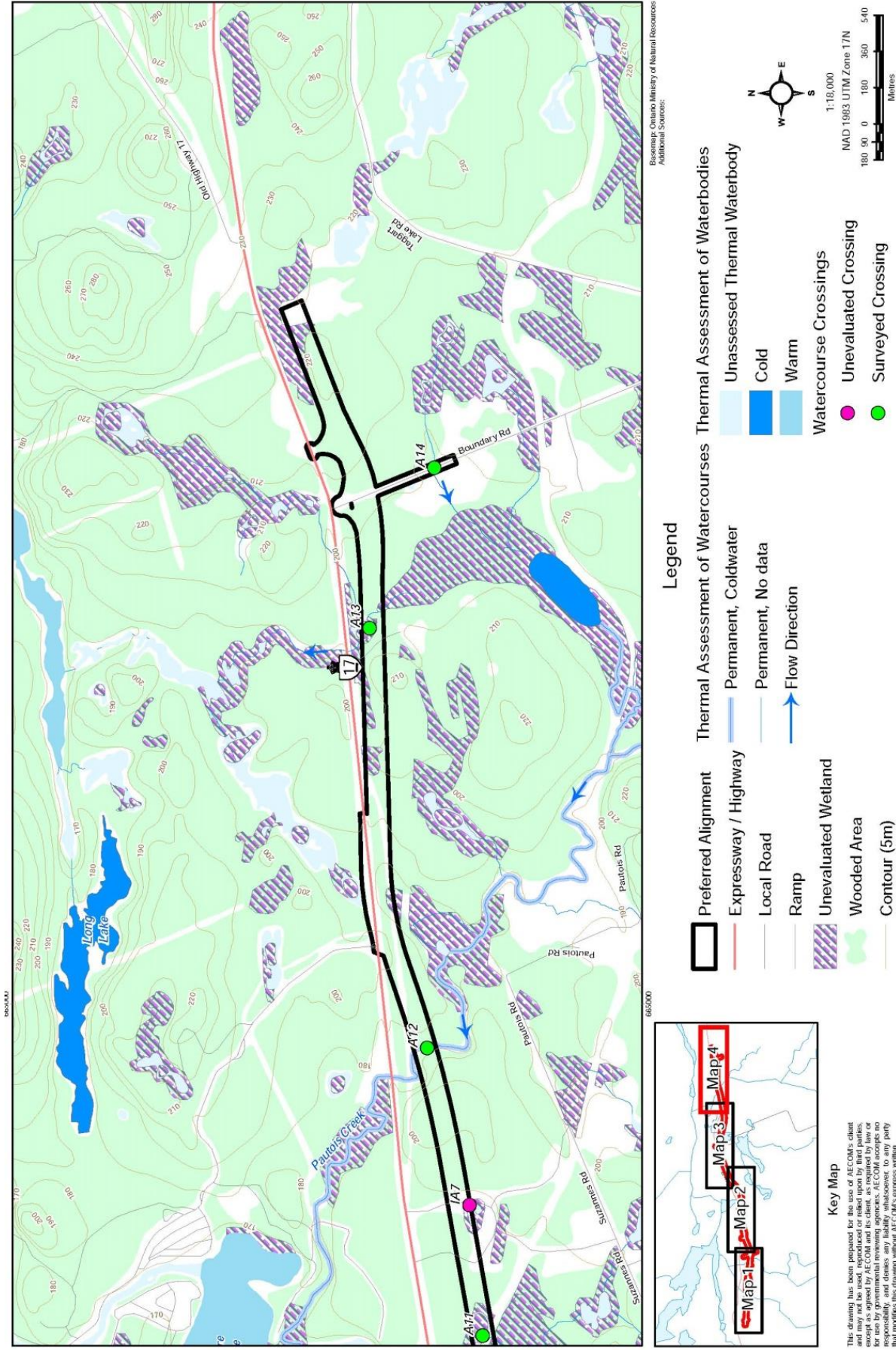
Key Map
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Legend

	Preferred Alignment		Thermal Assessment of Watercourses Permanent, Coldwater		Thermal Assessment of Waterbodies Unassessed Thermal Waterbody
	Expressway / Highway		Thermal Assessment of Watercourses Permanent, No data		Watercourse Crossings Warm
	Major Road		Flow Direction		Watercourse Crossings Unevaluated Crossing
	Local Road		Unevaluated Wetland		Watercourse Crossings Surveyed Crossing
	Wooded Area				
	Contour (5m)				

Scale: 1:18,000
 MAD 1983 UTM Zone 17N
 180 90 0 180 360 540
 Metres

Figure 3.4: Aquatic Habitat Survey Sites



The fish habitat assessment was conducted in accordance with standard MTO procedures and documented on the appropriate forms (e.g., Section 4: Field Investigations, Appendix 4.A: Watercourse Field Record Form and Appendix 4.C Fish Habitat Mapping). Photographic documentation of each site was obtained at the time of investigation. Representative photographs are presented in Section 3.2 below and generally, the information collected at each site included:

- Surrounding landuse;
- Stream morphology (including width and depth);
- Flow;
- Bank stability;
- Instream cover;
- Riparian cover;
- Migratory obstructions;
- Potential critical habitat (includes spawning and groundwater evidence); and
- Potential enhancement opportunities.

3.2 Field Investigations Results

Results of the Fish Habitat assessment are described below in **Tables 3.2 to 3.13**. Field notes are found in **Appendix B**. Acronyms found in Fish Habitat tables include:

- MWW – mean wetted width;
- MWD – mean wetted depth;
- MBW – mean bankfull width;
- MBD – mean bankfull depth;
- MWL – mean wetted length (applicable to ponds only).

A summary of the existing conditions can be found in **Appendix C**.

Table 3.2: Fish habitat assessment for Site A1



Site Location Identifier	Date of Investigation	Watercourse Name	Overall Site Description	Watercourse Fish Habitat Description	Notes															
A1	September 19, 2013	Blueseal Creek	The reach runs through a mixed forest and into a grass cattle field.	<p>The watercourse was a meandering system with a moderate gradient and a fast flow at the time of investigation. There were riffle, run, pool sequences that occur when flowing through the forest. The banks were slightly unstable with some undercutting. Riparian vegetation was a mix of trees, shrubs and grasses which provided moderate canopy cover. The substrate was dominated by boulder and cobble followed by sand. Instream cover was high consisting mainly of cobble and boulder with some woody debris, organic debris, aquatic vegetation and undercut banks.</p> <table border="1"> <thead> <tr> <th></th> <th>(m)</th> <th>(m)</th> </tr> </thead> <tbody> <tr> <td>MWV</td> <td>5</td> <td>MWV</td> </tr> <tr> <td>MBW</td> <td>6</td> <td>MBD</td> </tr> <tr> <td></td> <td></td> <td>0.4</td> </tr> <tr> <td></td> <td></td> <td>0.6</td> </tr> </tbody> </table> <p>Water chemistry: temperature = 11.64°C; pH = 6.68; conductivity = 37 µS/cm; dissolved oxygen = 13.82 mg/L.</p>		(m)	(m)	MWV	5	MWV	MBW	6	MBD			0.4			0.6	<p>Coldwater system with Brook Trout.</p> <p>School of cyprinids observed.</p> <p>Potentially Brook Trout spawning, gravel bed at beginning of riffle area.</p> <p>Landowner says he has caught Brook Trout in last 3 years.</p>
	(m)	(m)																		
MWV	5	MWV																		
MBW	6	MBD																		
		0.4																		
		0.6																		
																				
			<p>Photograph 1. Overview of channel at upstream end, looking downstream.</p>	<p>Photograph 2. Overview of channel at downstream end, looking downstream.</p>																

Table 3.3: Fish habitat assessment for Site A2



Site Location Identifier	Date of Investigation	Watercourse Name	Overall Site Description	Watercourse Fish Habitat Description	Notes												
A2	June 7, 2013 September 19, 2013	Un-named Tributary of Sharpes Creek	The watercourse is located in a small valley that flows through a marsh wetland area which is immediately surrounded by meadow. Beyond the meadow is a mixed forest along the slopes of the small valley.	<p>The watercourse was a poorly defined system that meandered through a wetland marsh area and narrowed through the culvert. The flow is slow and the stream is mostly pools, runs and flats with some narrowed areas creating riffles. It flows north along McNutt Road but bends 90° and crosses McNutt Road flowing east. The banks are slightly undercut and highly vegetated with grasses and shrubs. The substrate is dominated by cobble followed by sand, silt, clay muck and boulders. Instream cover is moderate and dominated by cobble followed by a mix of boulders and aquatic vegetation.</p> <table border="1"> <thead> <tr> <th></th> <th>(m)</th> <th>(m)</th> </tr> </thead> <tbody> <tr> <td>MWW</td> <td>3.75</td> <td>MWD</td> </tr> <tr> <td>MBW</td> <td>5</td> <td>MBD</td> </tr> <tr> <td></td> <td></td> <td>0.7</td> </tr> </tbody> </table> <p>Water chemistry (June 2013): temperature = 14.57°C; pH = 7.53; conductivity = 140 µS/cm; dissolved oxygen = 4.86 mg/L.</p>		(m)	(m)	MWW	3.75	MWD	MBW	5	MBD			0.7	Less than 200m downstream the tributary connects to Sharpes Creek which is a coldwater system, with Brook trout present.
	(m)	(m)															
MWW	3.75	MWD															
MBW	5	MBD															
		0.7															
																	
			<p>Photograph 1. Overview, looking upstream (west) from McNutt Road.</p>	<p>Photograph 2. Overview, looking downstream (east) from McNutt Road.</p>													

Table 3.4: Fish habitat assessment for Site A3



Site Location Identifier	Date of Investigation	Watercourse Name	Overall Site Description	Watercourse Fish Habitat Description	Notes									
A3	September 16, 2013	Un-named Tributary of Sharpes Creek	The watercourse runs through a small forested valley that is surrounded by crop farming.	<p>The watercourse was a meandering system that slowly flows west across Rutherglen Line. At the time of investigation flow was slow and comprised of pools, flats and runs. It was unclear whether the stream flow was permanent. The banks were densely vegetated with grasses and shrubs that provide high canopy cover. The substrate is sandy silty clay with muck. Instream cover was low (15%) and comprised mostly of overhanging (into the water) grasses and shrubs. A perched culvert (0.3m) created a migratory obstruction.</p> <table border="1"> <thead> <tr> <th></th> <th>(m)</th> <th>(m)</th> </tr> </thead> <tbody> <tr> <td>MWW</td> <td>1.0</td> <td>MWD 0.10</td> </tr> <tr> <td>MBW</td> <td>1.5</td> <td>MBD 0.25</td> </tr> </tbody> </table> <p>Water chemistry: temperature = 8.51 °C; pH = 4.93; conductivity = 25 µS/cm; dissolved oxygen = 0.65 mg/L.</p>		(m)	(m)	MWW	1.0	MWD 0.10	MBW	1.5	MBD 0.25	
	(m)	(m)												
MWW	1.0	MWD 0.10												
MBW	1.5	MBD 0.25												
														
			Photograph 1. Overview, looking upstream (east) from Rutherglen Line.	Photograph 2. Overview, looking downstream (west) from Rutherglen Line.										

Table 3.5: Fish habitat assessment for Site A4





Site Location Identifier	Date of Investigation	Watercourse Name	Overall Site Description	Watercourse Fish Habitat Description	Notes															
A4	June 7, 2013	Mattawa River/Pimisi Bay Tributary	A large wetland system on either side of Hwy 17. Surrounding landuse includes residential, small farm operations (cattle), small industry (stone works).	<p>The waterbody was a large wetland area that slowly flows from north to south tunneling through a concrete box culvert. On the upstream side there was a small riffle area with a mean wetted width of 2m, and mean wetted depth of 0.3m. The banks were stable and vegetated with grasses and shrubs. Canopy cover was low and only provided by bank shrubs and grasses and instream grasses. The substrate was soft and mucky. Instream cover was high (85%) and dominated by aquatic vegetation – emergent (grasses, cattails), floating (lily pads), submergent (grasses, algae) and woody debris.</p> <table border="1"> <thead> <tr> <th></th> <th>(m)</th> <th>(m)</th> </tr> </thead> <tbody> <tr> <td>MWW</td> <td>20</td> <td>MWD</td> </tr> <tr> <td>MBW</td> <td>20</td> <td>MBD</td> </tr> <tr> <td></td> <td></td> <td>n/a</td> </tr> <tr> <td></td> <td></td> <td>n/a</td> </tr> </tbody> </table> <p>Water chemistry: temperature = 16.38°C; pH = 7.29; conductivity = 197 µS/cm; dissolved oxygen = 5.22 mg/L.</p>		(m)	(m)	MWW	20	MWD	MBW	20	MBD			n/a			n/a	School of cyprinid fish observed during investigation.
	(m)	(m)																		
MWW	20	MWD																		
MBW	20	MBD																		
		n/a																		
		n/a																		
																				
			Photograph 1. Overview, looking upstream (south) from Hwy 17.	Photograph 2. Overview, looking downstream (north) from Hwy 17.																

Table 3.6: Fish habitat assessment for Site A5

Site Location Identifier	Date of Investigation	Watercourse Name	Overall Site Description	Watercourse Fish Habitat Description	Notes											
A5	September 16, 2013	Pimisi Bay Tributary	The watercourse runs through mixed forest valley and enters into Pimisi Bay.	<p>The upper reaches of the tributary were high gradient with water flowing over boulders, as the watercourse approaches Pimisi Bay it became lower gradient with finer substrates in the stream bed. It was a meandering system, with some braiding, and riffle, run, pool sequences. The overall flow was fast and the water was clear. The banks were slightly unstable with some undercutting observed. The substrate was dominated by sand followed by a mix of silt, clay, gravel, cobble and boulder. Instream cover was moderate with boulder and cobble providing the highest amount followed by undercut banks, woody debris, and organic debris.</p> <table border="1"> <thead> <tr> <th></th> <th>(m)</th> <th>(m)</th> </tr> </thead> <tbody> <tr> <td>MWW</td> <td>3.0</td> <td>MWD</td> <td>0.25</td> </tr> <tr> <td>MBW</td> <td>3.8</td> <td>MBD</td> <td>0.55</td> </tr> </tbody> </table> <p>Water chemistry: temperature = 10.43°C; pH = 6.9; conductivity = 180 µS/cm; dissolved oxygen = 13.14 mg/L.</p>		(m)	(m)	MWW	3.0	MWD	0.25	MBW	3.8	MBD	0.55	A young of the year Brook Trout was observed in the upper reaches of the watercourse indicating spawning activities in the system. Gravel islands observed throughout.
	(m)	(m)														
MWW	3.0	MWD	0.25													
MBW	3.8	MBD	0.55													
																
			Photograph 1. Overview, looking downstream in the upper reaches of the tributary	Photograph 2. High gradient section in the upper reaches of the tributary												





Fish habitat assessment for Site A5.	
	<p>Photograph 3. Overview of channel.</p>
	<p>Photograph 4. Overview of channel in lower gradient section.</p>
	<p>Photograph 5. Tributary as it enters Pimisi Bay.</p>
	<p>Photograph 6. Overview of Pimisi Bay from Hwy 17.</p>

Table 3.7: Fish habitat assessment for Site A6



Site Location Identifier	Date of Investigation	Watercourse Name	Overall Site Description	Watercourse Fish Habitat Description	Notes											
A6	June 6, 2013	Unnamed Waterbody	The waterbody is open water by Hwy 17 and drains into a marsh area. The study area is found mainly in the marsh area and is surrounded by a mixed forest.	<p>The pond had no observable flow and water was clear with a very slight brown tinge. The banks had a mix of boulders and cobble with the tree line close to the edge. The emergent aquatic vegetation was very dense allowing only pockets of open water. Habitat cover was high and a mix of emergents (grasses), floating (lily pad), and submergent (grasses and algae), woody debris. Substrate along the edge of the marsh were a mix of boulder, cobble, gravel, sand, silt, clay and detritus.</p> <table border="1"> <thead> <tr> <th></th> <th>(m)</th> <th>(m)</th> </tr> </thead> <tbody> <tr> <td>MWW</td> <td>100</td> <td>MWL</td> <td>500+</td> </tr> <tr> <td>MBW</td> <td>n/a</td> <td>MBD</td> <td>n/a</td> </tr> </tbody> </table> <p>Water chemistry: did not collect.</p>		(m)	(m)	MWW	100	MWL	500+	MBW	n/a	MBD	n/a	
	(m)	(m)														
MWW	100	MWL	500+													
MBW	n/a	MBD	n/a													
																
			Photograph 1. Overview of waterbody.	Photograph 2. Depression area within forest.												

Table 3.8: Fish habitat assessment for Site A7

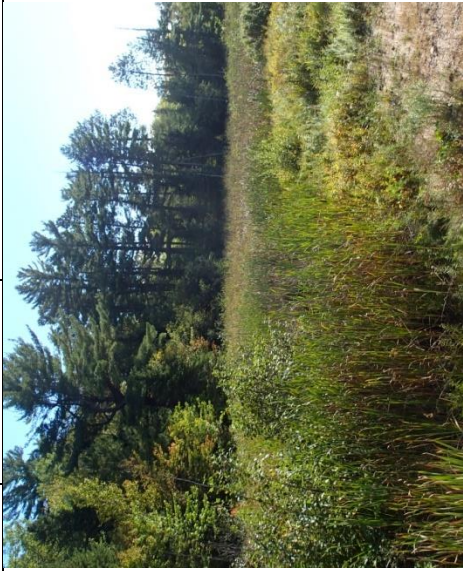



Site Location Identifier	Date of Investigation	Watercourse Name	Overall Site Description	Watercourse Fish Habitat Description	Notes												
A7	September 16, 2013	Unnamed Tributary	The watercourse flows along the roadside in a wetland marsh area and then flows into a forested area.	<p>There is a very poorly defined channel from the roadside culvert meandering into the forest. It never becomes a defined channel and the water that is present is not flowing. Likely this depression area collects overland flow in times of high precipitation and dries out during periods of dry weather. The substrate is soft and covered with organic debris. Water quality measurements were taken in a standing pool.</p> <table border="1"> <thead> <tr> <th></th> <th>(m)</th> <th>(m)</th> </tr> </thead> <tbody> <tr> <td>MWW</td> <td>1</td> <td>MWVD</td> </tr> <tr> <td>MBW</td> <td>n/a</td> <td>MBD</td> </tr> <tr> <td></td> <td></td> <td>n/a</td> </tr> </tbody> </table> <p>Water chemistry: temperature = 9.62°C; pH = 4.54; conductivity = 265 µS/cm; dissolved oxygen = 3.40 mg/L.</p>		(m)	(m)	MWW	1	MWVD	MBW	n/a	MBD			n/a	Watercourse is mapped as a permanent stream but poorly defined channel with organic debris as substrate, and likely dries up in the summer, suggesting it is intermittent
	(m)	(m)															
MWW	1	MWVD															
MBW	n/a	MBD															
		n/a															
																	
			Photograph 1. Overview of site from Hwy 17. Cattail marsh area then forest.	Photograph 2. Depression area within forest.													

Table 3.9: Fish habitat assessment for Site A8

Site Location Identifier	Date of Investigation	Watercourse Name	Overall Site Description	Watercourse Fish Habitat Description	Notes												
A8	September 19, 2013	Un-named Tributary of Amable du Fond River	The watercourse flows through a mixed forest with residential homes less than 200m south.	<p>The watercourse features a wide pooled area upstream of the road and flows into a straight channel downstream. The banks were stable and highly vegetated with grasses and shrubs. Canopy cover was low upstream but high downstream provided by trees and shrubs. The substrate was dominated by sand followed by cobble, boulder and clay. Instream cover was moderate (65%) and dominantly a mix of cobble and aquatic vegetation followed by boulder and woody debris. A potential fish barrier was observed on the upstream side of the culvert – a small beaver dam has been built. It is also the reason there is water backed up into a pool.</p> <table border="1"> <thead> <tr> <th></th> <th>(m)</th> <th>(m)</th> </tr> </thead> <tbody> <tr> <td>MWW</td> <td>4</td> <td>MWD</td> </tr> <tr> <td>MBW</td> <td>n/a</td> <td>MBD</td> </tr> <tr> <td></td> <td></td> <td>n/a</td> </tr> </tbody> </table> <p>Water chemistry: temperature = 13°C; pH = 6.49; conductivity = 148 µS/cm; dissolved oxygen = 13.32 mg/L.</p>		(m)	(m)	MWW	4	MWD	MBW	n/a	MBD			n/a	Gravel beds observed in the downstream reach
	(m)	(m)															
MWW	4	MWD															
MBW	n/a	MBD															
		n/a															
																	
																	
			<p>Photograph 1. Overview of watercourse upstream, from Hwy 630. Looking west.</p>														
			<p>Photograph 2. Overview of watercourse downstream, from Hwy 630. Looking east.</p>														


Fish habitat assessment for Site A8.	
	
<p>Photograph 3. Beaver dam on upstream side of culvert.</p>	

Table 3.10: Fish habitat assessment for Site A9

Site Location Identifier	Date of Investigation	Watercourse Name	Overall Site Description	Watercourse Fish Habitat Description	Notes									
A9	September 18, 2013	Crooked Chute Lake	The study reach begins at the Crooked Chute Bay then narrows into a stream (or chute) before entering into Amable du Fond River. There are residential properties at the mouth of the bay but moving north into the stream the water flows through a mixed forest and meadow section where the natural gas pipeline lies.	<p>The site investigation began at the bay of Crooked Chute Lake which was greater than 50 m wide and 0.35m in water depth. The substrate was dominated by cobble and dense pondweed was growing. Grasses were present along the bank and edge of water. Eastern Elliptio (<i>Elliptio complanata</i>) mussels were observed throughout the bay area. The water flows out of the bay through a man-made cobble /boulder chute into a narrowed stream. The stream is a straight, low gradient channel that had slow flow (dimensions noted below). The banks are stable and vegetated with a mix of grasses, shrubs and trees. Canopy cover is low and provided by the trees and shrubs of the riparian vegetation. The substrate was dominated by cobble and sand followed by silt and detritus. Instream cover is moderate (75%) and dominated by cobble followed by aquatic vegetation (including grasses, pondweed, and algae), woody debris, organic debris and boulders.</p> <table border="1"> <thead> <tr> <th></th> <th>(m)</th> <th>(m)</th> </tr> </thead> <tbody> <tr> <td>MWW</td> <td>25</td> <td>MWD 0.75</td> </tr> <tr> <td>MBW</td> <td>26</td> <td>MBD 1.2</td> </tr> </tbody> </table> <p>Water chemistry: temperature = 16.14°C; pH = 6.70; conductivity = 27 µS/cm; dissolved oxygen = 10.65 mg/L.</p>		(m)	(m)	MWW	25	MWD 0.75	MBW	26	MBD 1.2	<p>Warmwater system with Brook Trout, Smallmouth Bass and Walleye.</p> <p>Ideal nursery habitat observed in the bay area where the grasses grow along the edge. (Young of the year fish observed)</p> <p>Dense number of mussels observed in bay area.</p>
	(m)	(m)												
MWW	25	MWD 0.75												
MBW	26	MBD 1.2												




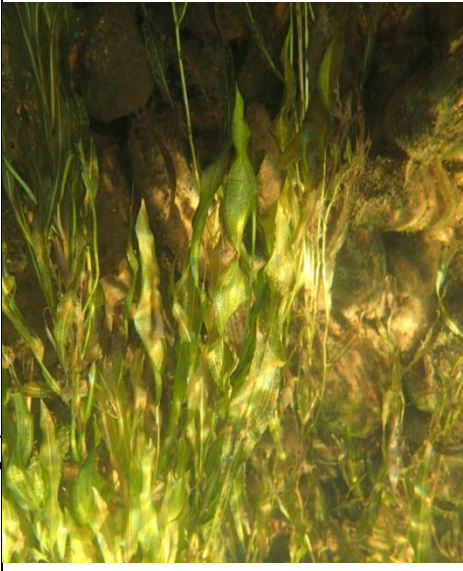
Fish habitat assessment for Site A9.	
	 <p>Photograph 1. Looking downstream from the bay area.</p>
 <p>Photograph 2. Looking upstream in the channelized chute area.</p>	 <p>Photograph 3. Mussel Eastern Ellipio (<i>Ellipio complanata</i>) found throughout mouth of bay.</p>
 <p>Photograph 4. Pondweed (<i>Potamogeton spp.</i>).</p>	

Table 3.11: Fish habitat assessment for Site A10

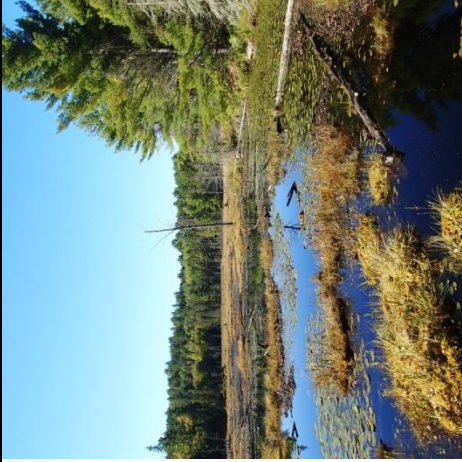
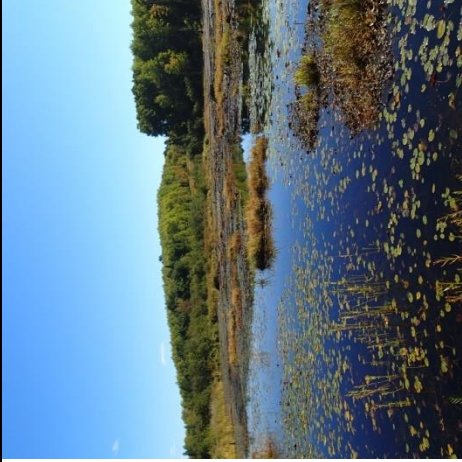
Site Location Identifier	Date of Investigation	Watercourse Name	Overall Site Description	Watercourse Fish Habitat Description	Notes											
A10	September 18, 2013	Un-named swamp/bog	The swamp/bog is part of a larger network of wetland marsh area and is surrounded by mixed forest. Likely created by beaver dams.	<p>This waterbody is likely the result of historical beaver activity. Four (4) beaver dams were observed throughout the pond however it was difficult to determine if they were currently active. The pond had no observable flow and water is clear and tea stained colour. The banks contained rocky outcrops and coniferous trees. The substrate is soft and mucky. There is a high amount of aquatic vegetation that is a mix of emergents (grasses), floating (lily pad), and submergent (grasses and algae). Large grass humps and tree stumps were present throughout.</p> <table border="1" data-bbox="651 527 760 926"> <thead> <tr> <th></th> <th>(m)</th> <th>(m)</th> </tr> </thead> <tbody> <tr> <td>MWW</td> <td>150</td> <td>MWL</td> <td>400</td> </tr> <tr> <td>MBW</td> <td>n/a</td> <td>MBD</td> <td>n/a</td> </tr> </tbody> </table> <p>Water chemistry: temperature = 13.2°C; pH = 5.50; conductivity = 24 µS/cm; dissolved oxygen = 2.30 mg/L.</p>		(m)	(m)	MWW	150	MWL	400	MBW	n/a	MBD	n/a	
	(m)	(m)														
MWW	150	MWL	400													
MBW	n/a	MBD	n/a													
																
			<p>Photograph 1. Overview of pond looking south.</p>	<p>Photograph 2. Overview of pond looking east.</p>												

Table 3.12: Fish habitat assessment Site A11




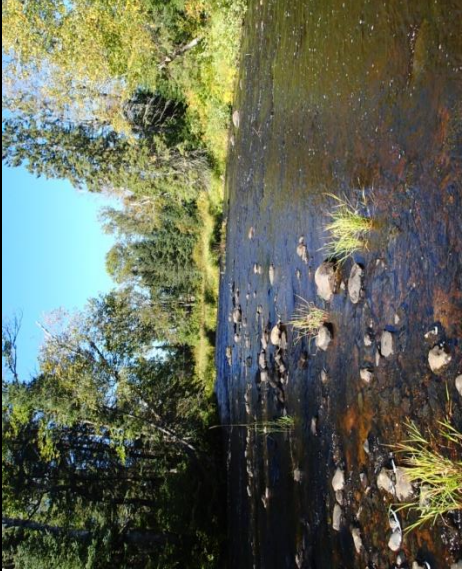
Site Location Identifier	Date of Investigation	Watercourse Name	Overall Site Description	Watercourse Fish Habitat Description	Notes												
A11	September 17, 2013	Un-named Tributary	The greater surrounding area is wetland marsh.	<p>The watercourse is a result of the large wetland system funnelling through the culvert under the rail line therefore, upstream of the rail line is wetland, and downstream of the rail line is a poorly defined channel with slow flow. The banks were stable and highly vegetated with grasses and shrubs. The instream cover was high and also consists of emergent grasses.</p> <table border="1" data-bbox="548 527 656 932"> <thead> <tr> <th></th> <th>(m)</th> <th></th> <th>(m)</th> </tr> </thead> <tbody> <tr> <td>MWW</td> <td>0.5</td> <td>IMWD</td> <td>0.1</td> </tr> <tr> <td>MBW</td> <td>n/a</td> <td>MBD</td> <td>n/a</td> </tr> </tbody> </table> <p>Water chemistry: temperature = 8.57°C; pH = 5.9; conductivity = 400 µS/cm; dissolved oxygen = 7.55 mg/L.</p>		(m)		(m)	MWW	0.5	IMWD	0.1	MBW	n/a	MBD	n/a	Watercourse a result of wetland drainage.
	(m)		(m)														
MWW	0.5	IMWD	0.1														
MBW	n/a	MBD	n/a														
<p>Photograph 1. Wetland area north of rail line.</p> 																	
<p>Photograph 2. Culvert outlet of watercourse.</p>																	

Table 3.13: Fish habitat assessment for Site A12

Site Location Identifier	Date of Investigation	Watercourse Name	Overall Site Description	Watercourse Fish Habitat Description	Notes											
A12	September 17, 2013	Pautois Creek	The watercourse flows through a mixed forest south of Hwy 17.	<p>The watercourse flowed in a fairly wide and straight, moderate gradient channel. The water had a moderate flow and was colourless. The banks were stable and vegetated predominantly with shrubs and some trees. Canopy cover was low and restricted to the shrub coverage along the banks. The substrate was a mix of sand, gravel, cobble and boulder. Instream cover was moderate and provided by cobble and boulder with minimal coverage provided by overhanging woody debris.</p> <table border="1"> <thead> <tr> <th></th> <th>(m)</th> <th>(m)</th> </tr> </thead> <tbody> <tr> <td>MWV</td> <td>20</td> <td>MWD</td> <td>0.23</td> </tr> <tr> <td>MBW</td> <td>22</td> <td>MBD</td> <td>0.45</td> </tr> </tbody> </table> <p>Water chemistry: temperature = 11.39°C; pH = 6.80; conductivity = 28 µS/cm; dissolved oxygen = 14.90 mg/L.</p>		(m)	(m)	MWV	20	MWD	0.23	MBW	22	MBD	0.45	<p>Coldwater system with Brook Trout.</p> <p>Identified as ideal spawning habitat for Brook Trout. Potential spawning areas cover a reach greater than 100m.</p>
	(m)	(m)														
MWV	20	MWD	0.23													
MBW	22	MBD	0.45													
																
			<p>Photograph 1. Overview of channel, looking downstream (south).</p>	<p>Photograph 2. Overview of channel, looking upstream (north).</p>												



Fish habitat assessment for Site A12.	
	<p>Photograph 3. Channel substrate.</p>
	<p>Photograph 4. Overview of channel looking downstream, with pipeline noted on right bank.</p>

Table 3.14: Fish habitat assessment for Site A13







Site Location Identifier	Date of Investigation	Watercourse Name	Overall Site Description	Watercourse Fish Habitat Description	Notes												
A13	September 17, 2013	Un-named Tributary	Along the roadside the waterbody is a large wetland. Moving south the water flows through a drier marsh area with cattails and mixed shrubs and grasses.	<p>The watercourse was a poorly defined channel with a very slow flow that ultimately enters into a wetland area by Hwy 17. The poorly defined channel meanders through cattails and had a soft substrate (mainly muck and detritus). Instream cover was high and consists of emergent vegetation cattails. Canopy cover is moderate to high and provided by the shrubs and cattails.</p> <table border="1" data-bbox="578 520 688 926"> <thead> <tr> <th></th> <th>(m)</th> <th>(m)</th> </tr> </thead> <tbody> <tr> <td>MWW</td> <td>1.5</td> <td>MWVD</td> </tr> <tr> <td>MBW</td> <td>n/a</td> <td>MBD</td> </tr> <tr> <td></td> <td></td> <td>n/a</td> </tr> </tbody> </table> <p>Water chemistry: temperature = 8.57°C; pH = 5.9; conductivity = 400 µS/cm; dissolved oxygen = 7.55 mg/L.</p>		(m)	(m)	MWW	1.5	MWVD	MBW	n/a	MBD			n/a	
	(m)	(m)															
MWW	1.5	MWVD															
MBW	n/a	MBD															
		n/a															
																	
			<p>Photograph 1. Watercourse flowing through cattails.</p>	<p>Photograph 2. Wetland area immediately south of Hwy 17.</p>													

Table 3.15: Fish habitat assessment for Site A14

Site Location Identifier	Date of Investigation	Watercourse Name	Overall Site Description	Watercourse Fish Habitat Description	Notes											
A14	September 17, 2013	Un-named Tributary of Pautois Creek	The watercourse runs through a grass, shrub meadow area before entering a mixed forest.	<p>The watercourse was a slightly meandering low gradient system that slowly flows westerly under Boundary Road. The banks were highly vegetated with grasses and shrubs and fairly stable (some minor undercutting observed). The substrate was dominated by clay with a mix of silt, sand, cobble, gravel and boulder. Instream cover was moderate and dominated by overhanging vegetation (into the water) followed by grasses, woody debris, organic debris, undercut banks, boulder and cobble. There was potential for a low flow barrier on the west side – an elevation increase. Dense grasses growing instream downstream of barrier was evidence flow is not permanent throughout year.</p> <table border="1"> <thead> <tr> <th></th> <th>(m)</th> <th>(m)</th> </tr> </thead> <tbody> <tr> <td>MWW</td> <td>1.75</td> <td>MWD</td> <td>0.25</td> </tr> <tr> <td>MBW</td> <td>1.85</td> <td>MBD</td> <td>0.55</td> </tr> </tbody> </table> <p>Water chemistry: temperature = 7.45°C; pH = 5.48; conductivity = 31 µS/cm; dissolved oxygen = 10.04 mg/L.</p>		(m)	(m)	MWW	1.75	MWD	0.25	MBW	1.85	MBD	0.55	Headwater to Pautois Creek.
	(m)	(m)														
MWW	1.75	MWD	0.25													
MBW	1.85	MBD	0.55													
																
			Photograph 1. Overview of upstream side from Boundary Road.	Photograph 2. Overview of downstream side from Boundary Road.												

Fish habitat assessment for Site A14.	
	
<p>Photograph 3. Overview of site from Hwy 17. Cattail marsh area then forest.</p>	<p>Photograph 4. Overview of site from Hwy 17. Cattail marsh area then forest.</p>

4. Potential Environmental Constraints

4.1 Species at Risk

The *Endangered Species Act* (ESA) (2007) is a provincial regulation that provides a protection and recovery strategy for Species at Risk in Ontario (SARO). Methods of protection include protection of SAR habitat; support for private and public organizations; recovery of species; and strict enforcement (Ontario MNR, 2013). The ESA regulation applies to Extirpated (EXP), Endangered (END) and Threatened (THR) species listed on the Species at Risk in Ontario (SARO) list. Species of Special Concern (SC) are not protected under the ESA however should be considered as their status could change and they may be added to the SARO list.

The *Species at Risk Act* (SARA) is a federal regulation. The goal of SARA is to monitor and protect disappearing species; provide recovery strategies for extirpated, endangered or threatened species, as well as to manage species of special concern. SARA is to be consulted when there is a need for permits and scientific/educational activities involving the handling of wildlife (Government of Canada, 2012). The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) is a committee of experts that assess and designate which wild species are in some danger of disappearing from Canada and provide guidance and input to SARA.

Through correspondence with the local MNR and the online database tools on the MNR website three (3) fish species have been identified as SAR- Lake Sturgeon, Shortjaw Cisco, and North Brook Lamprey. In reviewing suitable habitat potentially impacted by the recommended plan, only two (2) species have suitable habitat present in the study area and are described in **Table 4.1** below:

Table 4.1: Potential Fish Species at Risk in Study Area

Species	ESA Status	SARA Status	Habitat Present within the Study Area
Lake Sturgeon (Great Lakes-Upper St. Lawrence River population)	THR	No Status	Yes, potential
Northern Brook Lamprey	SC	SC Schedule 1	Yes, potential

Lake Sturgeon are listed as Threatened and are protected under the *Endangered Species Act* through the MNR and for critical habitat under *Species at Risk Act* through the DFO. Northern Brook Lamprey habitat was found during field investigations and is potentially present in the study area. The species is currently listed as a Species of Concern and so is not afforded protection under ESA however, should still be considered as it may become upgraded in the future.

Further consultation regarding these species will be required with appropriate agencies during the Detailed Design phase to discuss their presence, potential impacts, the need for specific design measures, construction constraints, mitigation measures, potential compensation and, if necessary, associated permit applications.

4.2 Significant Habitat

Specific habitat requirements vary as fish move through the different life cycle stages and each habitat can be considered important however, for the purposes of this report significant habitat is defined as unique spawning areas for SAR species and sensitive cold water species.

Field investigations identified potential habitat and spawning locations for the species at risk known to be in the area. As indicated above, further consultation with the agencies will be required during the Detail Design phase to discuss potential impacts, the need for specific design measures, construction constraints, mitigation measures, potential compensation and, if necessary, associated permit applications.

Brook Trout is a cold water species known to be sensitive to disturbances particularly during spawning activities. Accordingly, any potential spawning grounds or evidence of spawning activities present in the waterbodies investigated was noted during field investigations. Listed below are the details and locations in which Brook Trout spawning habitat was observed during field investigations:

- Site A12, located in Pautois Creek, there is a large stretch of ideal Brook Trout spawning habitat that measures ~1800m². No spawning activities observed at the time of investigation.
- Site A5, located in Pimisi Bay Tributary, a young of the year Brook Trout was observed in the upper reaches of the watercourse indicating spawning activities in the system. Gravel beds observed throughout the study area.
- Site A1, located Bluseal Creek, ideal gravel bed observed in watercourse that could potentially be used for Brook Trout spawning. Landowner has caught Brook Trout in last three (3) years.

Figure 1.3 displays known spawning areas for Muskellunge (*Esox masquinongy*), Northern Pike (*Esox lucius*), Smallmouth Bass, Walleye and other species that, although they have a higher tolerance for disturbance, the areas identified as potential habitat are considered important as it provides habitat during critical life cycle stages. The same protection will not likely be afforded to these areas as to those areas associated with SAR and Brook Trout, however, the potential to reduce impacts in these areas should be fully examined and reviewed with NBCA and DFO during detail design.

4.3 Mussels

Freshwater mussels are particularly susceptible to habitat destruction and disturbance as they do not have the means to avoid the activity. As such, additional investigations should be undertaken, and contract provisions should be developed during detail design for the mussels present within the study area as extra efforts will need to be made to ensure they are not harmed during construction. Should there be a high number of freshwater mussels present in the area of disturbance, a mitigation plan and relocation program should be considered and compiled by qualified biologists.

At Site A9, the mouth of the bay at Crooked Chute Lake had a high density of Eastern Elliptio and, although the habitat is not limited to this location, a relocation program may potentially be warranted.

5. Potential Impacts

The project works involved in building a freeway with two lanes in each direction, a 30m median within a 110m right-of-way, and interchange locations through a relatively undisturbed area results in a variety of impacts to fish habitat. Potential impacts may be temporary (occur during construction works) and/or permanent (residual impacts following completion of construction). The following sections outline the temporary and/or permanent impacts the construction of the new highway will potentially have on fish habitat.

The potential temporary impacts to fish and fish habitat include:

- Loss of direct and indirect fish habitat during construction works (coffer dams etc.);
- Disruption and/or augmentation to flow as a result of dewatering during construction;
- Riparian vegetation removal during construction;
- Alteration in water quality due to erosion and sedimentation during construction;
- Alteration of watercourse banks; and
- Temporary displacement of resident fish – relocated out of the work area when “working in the dry”.

The potential permanent impacts include:

- Loss of direct and indirect habitat caused by construction of permanent structures and by modifications to the existing watercourse channel;
- Altered stream flow due to channel and structure design;
- Removal of vegetation and change in canopy cover as a result of overhead structures;
- Soil compaction due to heavy equipment use on site; and
- Change in canopy cover – potentially increased or decreased depending on location of permanent structure.

Refinement of potential impacts on a site-specific basis should be undertaken during detail design.

6. Mitigation Measures

Mitigation measures can be better described and become site specific once detail design has been completed. The following is a brief list of general mitigation measures identified in the MTO Environmental Guide for Fish and Fish Habitat that should be included, but not limited to:

- Complete construction works within the appropriate timing windows, as determined by the North Bay MNR office;
- Avoid construction works in locations classified as sensitive spawning areas;
- Design bridges and culverts that provide wildlife and fish passage;
- Prepare an Erosion and Sediment Control plan and ensure all control measures are in place prior to the commencement of any construction activities and remain in place until all disturbed areas are fully stabilized to retain sediment on-site and prevent its entry into the watercourses;
- Prepare a re-vegetation planting plan that will help re-stabilize disturbed area and exposed soils;

7. Potential Enhancement or Compensation Measures

Potential enhancement and compensations measures can be better described once detail design has been completed; however, the following list highlights potential measures to be considered in addition to those presented in the MTO Environmental Guide for Fish and Fish Habitat:

- Diversify instream fish habitat cover and substrates using bio-engineering enhancements (ie. lunkers, root wads, tree cover);
- Salvage and replace spawning substrates disturbed during construction works;
- Design refuge pools for fish at inlet and outlets of culverts; and
- Design any re-aligned stream channel segments using morphological enhancements (ie. boulder placement, wing deflectors, channel constrictors, banks boulders).

Application of enhancements and compensation measures should be completed on-site or in the immediate vicinity of the works. However, when it is not feasible to complete the measures on-site, they may be applied off-site in the most appropriate location identified through discussions with DFO, MNR and NBCA.

8. Summary and Recommendations

The 2013 field assessment of fish habitat conditions was carried out at 14 of a possible 21 highway crossing locations due to limited access to waterbody crossing sites. As listed in Appendix B, the following sites were not assessed due to access restrictions imposed by private property owners: IA1, IA2, IA3, IA4, IA5, IA6, and IA7. Fish habitat assessment at these locations is recommended during detail design.

Fish community sampling was not carried out at any of the sites during the 2013 field assessment and is recommended during detail design to support site-specific evaluation of project risk to fish habitat, and to facilitate permitting.

A variety of impacts to fish habitat are anticipated based on the alignment of the recommended plan for Highway 17. Both temporary and permanent impacts are anticipated however the implementation of the proposed mitigation measures and the potential enhancement and compensation measures identified in Sections 6 and 7 should prevent an overall negative net effect.

It is suggested that with the design approaches and protection, mitigation and compensation measures identified in this report, the recommended highway alternative can be constructed with acceptable fisheries impacts.

9. References

AECOM, 2012:

Study Design Report and Summary of Existing Environmental Conditions and Constraints Report (GWP 5670-10-00) Bonfield easterly from 2.2km east of Highway 531 to 8.0km east of Highway 630.

AECOM, 2013:

Highway 17 Planning Study From 2.2 km east of Highway 531 easterly to 8.0 km east of Highway 630, (GWP 5670-10-00) Summary of Existing Environmental Conditions and Constraints Report, March 2013.

FoTenn Planning & Urban Design, 2012:

Township of Bonfield Official Plan August 3, 2012

Ontario Ministry of Natural Resources – North Bay District Office, 2012:

Personal communications with Julie Robinson, MNR District Planner on January 20, June 18 and June 20, 2012.

Ontario Ministry of Natural Resources, 2013:

Species at Risk online regional database,

http://www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/MNR_SAR_WHATS_AT_RISK_EN.html

Government of Canada, 2013:

Species at Risk online resource, http://www.sararegistry.gc.ca/default_e.cfm

Ministry of Transportation, 2009:

Environmental Guide for Fish and Fish Habitat, version June 2009.

North Bay Conservation Authority, 2012:

Personal communications with Paula Scott, NBCA Director on April 27, 2012.

Tunnock Consulting Ltd., 2010:

East Nippising Official Plan January 12, 2010