Appendix C:

Addendum: Water Assessment and Water Body Report

Stantec

Bow Lake Wind Farm Water Assessment and Water Body Report – Modification Document

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Prepared for:
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Sign-off Sheet

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1.0 Introduction

1.1 PROJECT OVERVIEW

Nodin Kitagan Limited Partnership and Nodin Kitagan 2 Limited Partnership, by their General Partners Shongwish Nodin Kitagan GP Corp. and Shongwish Nodin Kitagan 2 GP Corp., respectively (the "Proponent"), are proposing to develop Phase 1 and Phase 2 of the Bow Lake Wind Farm predominantly on Provincial Crown Land within the unorganized Townships of Smilsky and Peever, in the District of Algoma, Ontario (the "Project"). The Project is located approximately 80 km north of Sault Ste. Marie and roughly 6 km east of Montreal River Harbour. The Project has three Feed-in Tariff ("FiT") Contracts with the Ontario Power Authority ("OPA") for the sale of electricity generated by the Project. A Renewable Energy Approval ("REA") Application for the Project was submitted to the Ontario Ministry of the Environment ("MOE") on January 31, 2013.

A Water Assessment and Water Body Report (Stantec, 2013a) was completed for the Bow Lake Wind Farm and was submitted to MOE as part of the Project's REA Application.

Subsequent to the REA Application submission, the need was identified to install a fibre optic line from the Project's transformer station ("TS") to Highway 17 to facilitate communication to and from the Project. The fibre optic line will be installed within the road beds of Dump Road, Hogg Dam Road and MacKay Road with no direct disturbance to adjacent natural features. The edge of the roads where the fibre optic line is to be installed constitutes the Project Location for this Modification Document. Some sections of these road beds were included as part of the Project Location in the previous Water Assessment and Water Body Report submission and some sections were not. The total length of the fibre optic line from the TS to Hwy 17 is 11.54 km; of this 5.88 km is located in previously unassessed areas. Therefore, the Project Location will need to be modified to account for the new sections of road beds that will be utilized for the installation of the fibre optic line.

The edge of the roads where the fibre optic line will be installed is the outer limit where site preparation and construction activities will occur. The fibre optic line will connect to Great Lakes Power's Gartshore Transformer Station located on MacKay Road. The line will be installed underground within the existing entrance or exit roads to the Gartshore Transformer Station for a distance of approximately 50 m from MacKay Road. The revised Project Location showing the fibre optic line is illustrated on **Figure 1, Appendix A**.

The Proponent has retained Stantec Consulting Ltd. ("Stantec") to prepare a Water Assessment and Water Body Modification Document to the REA Application, as required under Ontario Regulation 359/09 - Renewable Energy Approvals under Part V.0.1 of the Environmental Protection Act, to assess the fibre optic line.

Excluding the modification of the Project Location for the fibre optic line installation there is no change to the Bow Lake Wind Farm's nameplate capacity of 58.32 MW and the remainder of the Project Location (including wind turbines, collector lines, pad-mounted transformers, crane pads, two permanent meteorological (met) towers, access roads, an operations and maintenance building, welfare buildings, a TS, construction compounds and laydown yards, and other ancillary facilities), as it was shown and assessed in the Water Assessment and Water Body Report (Stantec, 2013a) and the REA Application.

This Modification Document was prepared to identify any water bodies that were not considered within the original Bow Lake Wind Farm Water Assessment and Water Body Report (Stantec, 2013a). As such, this Modification Document provides a records review, site investigation and identifies potential effects and mitigation measures for new features not previously included in the Water Assessment and Water Body Report. Locations where water bodies are present within 120 m of the revised Project Location are presented in **Figures 2.1 to 2.4.** The designation of features as water bodies was in accordance with the definition of water body provided in O. Reg. 359/09 and based on observations completed by field staff during the time the surveys were completed.

This Water Assessment and Water Body Modification Document has been prepared in accordance with O. Reg. 359/09 (s. 39 and 40), the MOE document "Technical Guide to Renewable Energy Approvals" (MOE, 2009b), and the Ministry of Natural Resources' ("MNR") Approval and Permitting Requirements Document (APRD) (MNR, 2009c).

This report is submitted as a Modification Document to the Bow Lake Wind Farm Water Assessment and Water Body Report (Stantec, 2013a).

1.2 PROJECT LOCATION

The revised Project Location consists of sections of road beds and road shoulders of Dump Road, Hogg Dam Road and MacKay Road running from the Bell Demarcation Point near the intersection of Dump Road/Highway 17 to the proposed Bow Lake TS. As noted, sections of these roadbeds were previously assessed as part of the access road upgrade component of the Project in the Water Assessment and Water Body Report (Stantec 2013a). This Modification Document focusses on the unassessed sections of road beds.

All construction and installation activities associated with the fibre optic line will be confined to the existing (or upgraded) road beds. The fibre optic line will also connect to Great Lakes Power's Gartshore TS located on MacKay Road. The line will be installed underground within the existing entrance or exit roads to the Gartshore TS for a distance of approximately 50 m from MacKay Road. Detailed design work is currently underway and will determine the preferred location within the existing and upgraded road beds. Discussions with the MNR will be necessary to determine specific crown land permitting requirements.

The Project Location, the 120 m Zone of Investigation ("ZOI"), and areas previously assessed as part of the Water Assessment and Water Body Report are shown on **Figure 1, Appendix A**. This Modification Document does not change in any way the findings or conclusions presented in the Water Assessment and Water Body Report (Stantec 2013a).

1.3 REPORT REQUIREMENTS

A Water Assessment includes a records review and site investigation to determine the presence and boundaries of water bodies as defined in O. Reg. 359/09 within 120 m of the Project Location (assuming that no Lake Trout lakes that are at or above development capacity are identified within 300 m of the Project Location). If water bodies are identified within 120 m of the Project Location, a Water Body Report must be prepared.

A renewable energy project includes all activities associated with the construction, installation, operation, maintenance, and decommissioning of the renewable energy generation facility. Therefore, for the purposes of measuring the distance from the Project Location to a water body, the boundary of the revised Project Location, as defined in Section 1.2, is the edges of Dump Road, Hogg Dam Road and MacKay Road. This is also the outer limit where site preparation and construction activities will occur.

Table 1.1 summarizes the documentation requirements of the Water Assessment and Water Body Reports as specified under O. Reg. 359/09.

Table 1.1: Water Assessment Report and Water Body Report Requirements: O. Reg. 359/09

Requirements (Water Assessment)	Completed	Section Reference
A person who proposes to engage in a renewable energy project shall conduct a water assessment, consisting of the following:		
1. A records review conducted in accordance with section 30.	✓	2.2, 3.1
2. A site investigation conducted in accordance with section 31, including:		
31(4)(1). A summary of any corrections to the records review and the determinations made as a result of conducting the site investigation.	✓	2.3, Figures 2.1 to 2.4, Appendix A
31(4)(2). Information relating to each water body.	✓	3.1
31(4)(3). A map showing boundaries, location/type and distances.	✓	Figures 2.1 to 2.4, Appendix A
31(4)(4). A summary of methods used to make observations for the purposes of the site investigation.	✓	2.3
31(4)(5). The name and qualifications of any person conducting the site investigation.	✓	2.4
31(4)(6)(i). The dates and times of the beginning and completion of the site investigation.	✓	3.0

Table 1.1: Water Assessment Report and Water Body Report Requirements: O. Reg. 359/09

Requirements (Water Assessment)	Completed	Section Reference
If an investigation was conducted by visiting the site:		
31(4)(6)(ii). The duration of the site investigation.	✓	3.0
31(4)(6)(iii).The weather conditions during the site investigation	✓	3.0
31(4)(6)(iv). Field notes kept by the person conducting the site investigation.	✓	Appendices B, C
If an alternative investigation of the site was conducted:		
31(4)(7)(i). The dates of the generation of the data used in the site investigation.		N/A
31(4)(7)(ii). An explanation of why the person who conducted the alternative investigation determined that it was not reasonable to conduct the site investigation by visiting the site.		N/A
Requirements (Water Body)		
3. Report identifies and assesses any negative environmental effects of the project on a water body and on land within 30 metres of the water body.	✓	3.1, 3.2
4. Report identifies mitigation measures in respect of any negative environmental effects.	✓	3.1, 5.0
5. Report describes how the environmental effects monitoring plan addresses any negative environmental effects.	✓	6.2
6. Report describes how the construction plan report addresses any negative environmental effects.	✓	6.1

2.0 Methods

2.1 DEFINITION OF A WATER BODY

The presence or absence of water bodies within 120 m of the revised Project Location was assessed using the definition of a water body provided in O. Reg. 359/09, which is as follows:

"…a lake, a permanent stream, an intermittent stream and a seepage area but does not include, a) grassed waterways, b) temporary channels for surface drainage, such as furrows or shallow channels that can be tilled and driven through, c) rock chutes or spillways, d) roadside ditches that do not contain a permanent or intermittent stream, e) temporarily ponded areas that are normally farmed, f) dugout ponds, or g) artificial bodies of water intended for the storage, treatment or recirculation of runoff from farm animal yards, manure storage facilities and sites and outdoor confinement areas".

2.2 RECORDS REVIEW

A water records review was conducted according to Section 30(1) of O.Reg. 359/09. The available water body records maintained by the agencies listed in Section 30(2) were searched, as applicable, with most data gathered through agency requests and/or accessing online databases as follows:

- Background fisheries data acquired from the MNR Sault Ste. Marie District office
- Land Information Ontario ("LIO") mapping database
- Natural Heritage Information Centre online database

Copies of all correspondence related to the records review are provided in the Bow Lake Wind Farm Consultation Report (Stantec, 2013e), which was submitted to MOE on January 31, 2013. Information obtained as a result of the information requests/records review is presented in Section 3.0 of this report.

Watercourses and waterbodies identified by LIO mapping (MNR, 2009a) are included in **Figures 2.1 through 2.4, Appendix A**, where "watercourses" and "waterbodies" are water features (including lakes, rivers, streams, etc.), as mapped by MNR. These water features may or may not meet the definition of a water body as described in Section 2.1. Potential waterbodies were also identified through a review of aerial photographs of the ZOI. Further information on these potential water bodies was obtained during the site investigations (as described in Section 2.3).

The MNR had limited fish community or aquatic habitat data for the ZOI. All available data are included in water body descriptions provided in Section 3.1.

2.3 SITE INVESTIGATION

Site investigations were carried out according to Section 31 of O.Reg. 359/09. The investigations were conducted on several dates between April 30, 2012 and August 30, 2012 and July 14 and 15, 2013 as presented in Table 3.1. Records of field investigations are included in **Appendices B** and **C**.

The purpose of the site investigations was to:

- Field confirm the results of the records review to identify any required corrections;
- Determine whether any additional water bodies exist, other than those identified during the records review; and
- Identify the boundaries of any water body located within 120 m of the revised Project Location.

While on site, the field crews used visual inspections to verify the presence or absence of water bodies within 120 m of the Project Location.

In some cases, marshes or portions of other wetland features within the ZOI meet the definition of a water body if they are part of a channel containing permanent or intermittent flow, or a seepage area. Other wetland communities identified within the ZOI do not contain channelized water features and therefore do not meet the definition of a water body under O.Reg. 359/09. Wetland features within the ZOI are addressed in the Natural Heritage Assessment/Environmental Impact Study Report ("NHA/EIS") (Stantec, 2013b) and the NHA/EIS Modification Report (Stantec, 2013c).

Once the locations of water bodies were confirmed in the field, an aquatic habitat assessment was conducted within the 120 m ZOI. A combination of background data (where available) and results of Stantec's 2012 and 2013 site investigation surveys were used to determine which water bodies were 'fish bearing' within the revised Project Location and the 120 m ZOI.

The following criteria were used in the designation of water bodies as 'fish bearing':

- water bodies with available fish community data (background and/or Stantec surveys), or
- evidence of fish use such as visual observations during the Water Assessment, or
- water bodies that are accessible by fish from other fish bearing waters.

2.4 QUALIFICATIONS

The following Stantec personnel were responsible for the site investigation, identification of water bodies and for determining any potential implications to fish and aquatic habitat associated with installation of the fibre optic line:

- Mark Pomeroy, B.Sc. – Fisheries Biologist
- Nancy Harttrup, B.Sc. – Senior Fisheries Biologist
- Mitch Ellah, Tech. Dipl., B.Sc. (Hons.) – Aquatic Ecologist
- Katie Easterling, Tech. Dipl., B.Sc. (Hons.) – Aquatic Ecologist

Curricula vitae are provided in **Appendix D**.

3.0 Results

The dates, times and weather conditions during field investigations are presented in Table 3.1.

Table 3.1: Stantec 2012 and 2013 Site Investigation Information

Year	Date	Daily Duration of Site Visit	Air Temperature (Range) oC *	General Weather Observations
2012	April 30	8:30-17:00	0-8	Overcast, scattered showers.
2012	May 1	8:30-16:00	-1-19	Overcast, scattered showers.
2012	May 2	8:30-12:30	6-11	Overcast, scattered showers.
2012	July 5	10:00-17:30	17-31	Sunny, humid. No precipitation.
2012	July 6	9:30-17:30	13-28	Clear, humid.
2012	July 7	9:30-17:00	16-23	Mix of sun and cloud. Scattered showers
2012	July 8	10:00-17:30	11-24	No precipitation, partly cloudy, humid.
2012	July 9	9:00-17:00	10-23	Mostly sunny, humid, scattered showers.
2012	July 11	9:00-17:00	8-28	Mostly clear, no precipitation.
2012	July 12	8:00-16:00	12-30	No precipitation in previous 24 hrs. Partly cloudy. Light winds.
2012	July 13	9:00-16:00	12-31	No precipitation in previous 24 hrs. Clear.
2012	July 14	9:00-16:30	19-28	Mostly clear with scattered showers.
2012	July 15	9:00-16:30	19-26	Morning showers, clearing by afternoon.
2012	July 16	9:00-16:30	17-26	Morning fog, scattered showers in afternoon.
2012	August 9	9:00-16:00	13-24	Clear, no precipitation.
2012	August 27	8:30-18:00	17-24	Morning fog, scattered showers.
2012	August 28	8:30-18:00	9-21	Sunny with morning fog.
2012	August 29	8:30-18:00	7-25	Clear, no precipitation
2012	August 30	9:00-12:00	12-28	Clear, no precipitation
2013	July 14	9:00-15:00	12-30	Clear, no precipitation
2013	July 15	9:00-15:30	14-32	Clear, no precipitation

*Temperature ranges from Sault Ste. Marie weather station, Environment Canada, 2012 and 2013.

As indicated in Section 2.1, the presence or absence of water bodies within the revised Project Location and the ZOI was assessed using the definition of a water body provided in O. Reg. 359/09. Based on the results of field investigations and the records review, water bodies within 120 m of the revised Project Location are summarized in Sections 3.1, and are illustrated on **Figures 2.1 to 2.4** (**Appendix A**).

A total of thirty-four (34) water bodies were identified within the revised Project Location and the 120 m ZOI. During field investigations, there were several water bodies identified within 120 m of the revised Project Location, in addition to those identified on MNR mapping. Locations of all water bodies are presented in **Appendix A**. Photographs and field notes recorded during field investigations are provided in **Appendices B and C** respectively.

A summary of aquatic habitat characteristics within the 120 m ZOI is presented in **Table 3.2.** Water bodies that are fish bearing within the ZOI are identified on **Figures 3.1 to 3.4** (**Appendix A**).

Section 39(1) of O. Reg. 359/09 prohibits the construction, installation or expansion of a renewable energy generation facility in a project location that is within 30 m of the average annual high water mark of a lake, intermittent stream, permanent stream or seepage area. However, this prohibition does not apply if, in addition to the preparation of a Water Body Report, certain components of the renewable energy facility remain outside of the 30 m setback. For Class 3 or 4 wind facilities, turbines and transformer substations must be located at least 30 m from a lake, stream or seepage area.

Based on a review of the document entitled "Inland Ontario Lakes Designated for Lake Trout Management" (MNR, 2003), there are no Lake Trout lakes that are at or above development capacity identified within 300 m of the Project Location.

3.1 EXISTING CONDITIONS AND PREDICTED IMPACTS

Available background data are provided for each water body reach surveyed, followed by site-specific information regarding physical habitat as determined by Stantec during site investigations in 2012 and 2013 (Table 3.2). Potential impacts and general mitigation measures are also provided for each water body that occurs within the ZOI.

Located within the Agawa Tertiary Watershed, the revised Project Location for the fibre optic line is confined within the road beds or shoulders of existing public roads or the beds or shoulders of existing public roads once they have been upgraded to facilitate transport of Project components and construction materials. Natural environment features and functions within the ZOI associated with the sections of roads to be upgraded were assessed in the Natural Heritage Assessment/Environmental Impact Study Report ("NHA/EIS") (Stantec, 2013b) and the Water Assessment and Water Body Report (Stantec, 2013a). The ZOI for the revised Project Location extends to 120 m on each side of the roads and is characterized by moderately rolling terrain dominated by deciduous forest and areas of shallow bedrock.

Water bodies with both permanent and intermittent flow regimes are represented within the revised Project Location. The watercourses often originate on strongly sloping terrain and contribute flow to larger, permanently flowing streams located in down gradient areas. Some of the larger channels drain through small ponds prior to converging with the Montreal River.

Water bodies in the vicinity of the revised Project Location have either warmwater or coldwater thermal regimes and associated fish populations (if present), depending on the amount of groundwater input they receive.

MNR records (MNR, 2011) and Stantec's 2012 and 2013 field investigations indicate that the following fish species may be present in water bodies within the ZOI:

- Lake Trout (Montreal River only)
- Brook Trout
- Central Mudminnow
- Brook Stickleback
- White Sucker
- Blacknose Dace
- Fathead Minnow
- Yellow Perch
- Finescale Dace
- Golden Shiner
- Northern Redbelly Dace
- Mottled Sculpin

Table 3.2: Summary of Water Body Characteristics Within the 120 m Zone of Investigation

Reach ID[a]	Site Description[b]	Fish Bearing? (with rationale)	Proposed Works	Potential Impacts	Mitigation	Net Effects
0-3	Intermittent flow. No Surface flow during field investigations. Steep gradient. Riparian area dominated by sugar maple and birch. Wetted Width = 0.4 Bankfull width = 1.2 m Water Depth = 3 cm (water depth in isolated pools observed in the vicinity of Dump Road) Substrate = Sand, detritus, cobble, and boulder. No culvert under Dump Road	Intermittent Flow Fish are present in the Montreal River approximately 370 m downstream from Dump Road. Steep channel gradient and intermittent flow presents an impediment to upstream fish passage and confines fish utilization to extreme lower reaches during periods of adequate flow conditions. Not fish bearing in ZOI.	Installation of a fibre optic line within the existing and upgraded road beds (**Figure 2.1**).	Construction activities associated with installing the fibre optic line have the potential to affect water quality in downstream reaches through a temporary increase in surface water turbidity due to sediment runoff or the accidental release of a deleterious substance (e.g. oil or fuel spill). (See Section 4.1)	Ensure implementation of appropriate mitigation measures. See Sections 5.1.	None expected
0-2	Intermittent flow. Channel dry during field investigations. Steep gradient. Riparian area dominated by sugar maple and birch. Bankfull width = 0.6 m Substrate = Sand, silt, gravel Perched culvert at Dump Road.	Intermittent Flow Fish are present in the Montreal River approximately 250 m downstream from the road. Steep channel gradient, intermittent flow and a perched culvert at Dump Road are impediments to fish passage from the Montreal River and confines fish utilization to extreme lower reaches during periods of adequate flow conditions. Not fish bearing in ZOI.	Installation of a fibre optic line within the existing and upgraded road beds (**Figure 2.1**			
FO-2	Intermittent flow southwest (upstream) of Dump Road with poor channel definition. Permanent flow northeast (downstream) of Dump Road dominated by riffle morphology. Riparian vegetation comprised of sugar maple, yellow birch and balsam fir. Reach upstream of Dump Road dry during field investigations. Downstream : Bankfull width = 2.0 m Wetted width = 1.0 m Water depth = 10 cm Substrate = cobble, sand, boulder, gravel, bedrock and detritus. Steep gradient likely creates a barrier to fish passage. Culvert under Hogg Dam Road.	Permanent flow downstream of Hogg Dam Road. Steep gradient poses an impediment to fish passage. Fish are present in the Montreal River approximately 295 m downstream from the road. Not fish bearing in the ZOI.	Installation of a fibre optic line within the existing and upgraded road beds (**Figure 2.1**			

Table 3.2: Summary of Water Body Characteristics Within the 120 m Zone of Investigation

Reach ID[a]	Site Description[b]	Fish Bearing? (with rationale)	Proposed Works	Potential Impacts	Mitigation	Net Effects
FO-3	Pond containing surface water year-round. Flat morphology. Riparian vegetation comprised of birch, maple and spruce. Bankfull width = 10 m Wetted width = 8 m Water depth = 25 cm Substrate = detritus and muck FO-3 is located on the south side of Hogg Dam Road and is not connected to the Montreal River. No channel exists downstream of Hogg Dam Road. Upstream of the road, an old skidder trail has restricted flow out of the ponded area towards the road and there is no channel from the pond to the road. The pond may provide spawning or nursery habitat for small-bodied fish. No culvert under Hogg Dam Road.	Permanent pond south of road. Skidder trail restricts flow out of the ponded area and fish cannot access the pond from downstream (no channel). Disconnected from any downstream fish community, but may support a population of small-bodied fish. The pond may be connected farther upstream to a small inland lake that is likely fish bearing.	Installation of a fibre optic line within the existing and upgraded road beds (**Figure 2.2**).	Construction activities associated with installing the fibre optic line have the potential to affect water quality in downstream reaches through a temporary increase in surface water turbidity due to sediment runoff or the accidental release of a deleterious substance (e.g. oil or fuel spill). (See Section 4.1)	Ensure implementation of appropriate mitigation measures. See Sections 5.1.	None expected
FO-5	Permanent flow dominated by riffle morphology. Riparian vegetation consists of sugar maple, birch and balsam fir. Bankfull width = 1.2 m Wetted width = 1.0 m Water depth = 2 cm Substrate = sand, gravel, cobble and detritus Source of flow is a groundwater seep located outside of the Project Location west of Hogg Dam Road. Steep gradient likely a barrier to fish passage. No culvert under Hogg Dam Road and no channel upstream (east) of road.	Permanent flow. Fish are present in the Montreal River approximately 150 m downstream of road. Steep gradient is an impediment to fish passage from the Montreal River. Not fish bearing except in extreme lower reaches.	Installation of a fibre optic line within the existing and upgraded road beds (**Figure 2.2**).			

Table 3.2: Summary of Water Body Characteristics Within the 120 m Zone of Investigation

Reach ID[a]	Site Description[b]	Fish Bearing? (with rationale)	Proposed Works	Potential Impacts	Mitigation	Net Effects
FO-4	Permanent flow dominated by riffle morphology. Riparian vegetation comprised of sugar maple, white cedar and yellow birch. Bankfull width = 0.6 m Wetted width = 0.4 m Water depth = 3 cm Substrate = sand, gravel, cobble, boulder and detritus Steep gradient likely creates a barrier to fish passage. FO-4 originates on the east side of Hogg Dam Road, flows south along the east side of the road and then crosses the road through an existing culvert, eventually draining into the Montreal River. Culvert under Hogg Dam Road.	Permanent flow. Fish are present in the Montreal River approximately 180 m downstream from road Steep gradient is an impediment to fish passage from the Montreal River. Not fish bearing except in extreme lower reaches.	Installation of a fibre optic line within the existing and upgraded road beds (**Figure 2.2**).	Construction activities associated with installing the fibre optic line have the potential to affect water quality in downstream reaches through a temporary increase in surface water turbidity due to sediment runoff or the accidental release of a deleterious substance (e.g. oil or fuel spill). (See Section 4.1)	Ensure implementation of appropriate mitigation measures. See Sections 5.1.	None expected
FO-6	FO-6 is a side tributary off of FO-4. Permanent flow dominated by riffle morphology. Riparian vegetation consists of sugar maple, birch and balsam fir. This water body is located west of Hogg Dam Road (does not cross the road). Bankfull width = 0.5 m Wetted width = 0.3 m Water depth = 3 cm Substrate = sand, gravel, cobble and detritus Source of flow is a groundwater seep associated with FO-4 (the seep is located upstream of Hogg Dam Road). Steep gradient likely a barrier to fish passage. The fibre optic line is to be located within the existing Hogg Dam Road, approximately 60 m east of FO-6. No crossing required.	Permanent flow. Steep gradient an impediment to fish passage. Fish are present approximately 180 m downstream from confluence of FO-4 and FO-6, in Montreal River. Steep gradient an impediment to fish passage and fish utilization confined to extreme lower reaches.	Installation of a fibre optic line within the existing and upgraded road beds (**Figure 2.2**).			
9B-11	Permanent flow dominated by riffle morphology. Riparian area consists of small sugar maples and herbaceous plant species. Steep gradient downstream of Hogg Dam Road and perched culvert precludes upstream fish movement. Bankfull width = 2 m Wetted width = 0.65 m Water depth = 5 cm Substrate = Cobble, sand, gravel, muck, and detritus Perched culvert under Hogg Dam Road.	Permanent flow. Fish are present approximately 250 m downstream from road in the Montreal River. No catch during 2012 surveys at road crossing. Steep gradient and perched culvert are impediments to fish passage from the Montreal River. Fish bearing in extreme downstream reaches.	Installation of a fibre optic line within the existing and upgraded road beds (**Figure 2.2**).			

Table 3.2: Summary of Water Body Characteristics Within the 120 m Zone of Investigation

Reach ID[a]	Site Description[b]	Fish Bearing? (with rationale)	Proposed Works	Potential Impacts	Mitigation	Net Effects
9B-10	Permanent flow dominated by riffle morphology. Upstream (east of Hogg Dam Road) riparian area dominated by white birch, sugar maple, eastern white cedar. Steep slopes and sparse vegetation downstream (west) of Hogg Dam Road. Perched culvert at Hogg Dam Road. Bankfull width = 2.5 m Wetted width = 1.2 m Water depth = 8 cm Substrate (both sides of road) = Sand, cobble, gravel, and detritus Great Lakes Environmental Services (GLES, 2012) observed Brook Trout and Mottled Sculpin downstream of Hogg Dam Road. Stantec did not observe or capture any fish (Stantec, 2013a). Possible changes in morphology and flow characteristics (due to erosion or slumping) may contribute to the discrepancy between the findings.	Permanent flow. Fish are present approximately 30 m downstream of Hogg Dam Road (downstream of reach with steep channel gradient) according to background information. No catch during 2012 surveys at road crossing. Steep gradient and perched culvert are impediments to fish passage from the Montreal River. Fish bearing in downstream reaches.	Installation of a fibre optic line within the existing and upgraded road beds (**Figure 2.2**).	Construction activities associated with installing the fibre optic line have the potential to affect water quality in downstream reaches through a temporary increase in surface water turbidity due to sediment runoff or the accidental release of a deleterious substance (e.g. oil or fuel spill). (See Section 4.1)	Ensure implementation of appropriate mitigation measures. See Sections 5.1 .	None expected
9B-9 & FO-21 (Montreal River)	This side bay of the Montreal River consists of permanent flow dominated by pool morphology. Riparian area dominated by steep slopes and mature trees. School of Cyprinids observed in shallows. Bankfull width = 235 m Wetted width = 235 m Water depth = > 1.5 m Substrate (at shore) = Gravel, cobble, sand and boulder. MNR data indicates the presence of Lake Trout in the Montreal River. Fibre optic line to be located within existing Hogg Dam Road, approximately 45 m east of the Montreal River. No water crossing required.	Permanent flow. No barriers to fish movement. Fish are present within the Montreal River.	Installation of a fibre optic line within the existing and upgraded road beds (**Figures 2.2 and 2.3**).			

Table 3.2: Summary of Water Body Characteristics Within the 120 m Zone of Investigation

Reach ID[a]	Site Description[b]	Fish Bearing? (with rationale)	Proposed Works	Potential Impacts	Mitigation	Net Effects
9B-8	Permanent flow dominated by pool morphology. Riparian area dominated by black spruce and white birch. Upstream of Hogg Dam Road, watercourse is ponded and deep (>1 m). Downstream of Hogg Dam Road, watercourse is narrow and very shallow. Bankfull width (upstream) = 10 m Bankfull width (downstream) = 1 m Wetted width (upstream) = 10 m Wetted width (downstream) = 0.5 m Water depth (downstream) = 5 cm Substrate = Cobble, gravel (downstream); Silt, detritus, muck, and sand (upstream) Culvert under Hogg Dam Road.	Permanent flow. Fish are present approximately 30 m downstream from Hogg Dam Road in the Montreal River. No fish captured or observed during 2012 surveys at road crossing. Steep gradient an impediment to fish passage from the Montreal River upstream of Hogg Dam Road. Not fish bearing except in lower reaches.	Installation of a fibre optic line within the existing and upgraded road beds (**Figure 2.3**).	Construction activities associated with installing the fibre optic line have the potential to affect water quality in downstream reaches through a temporary increase in surface water turbidity due to sediment runoff or the accidental release of a deleterious substance (e.g. oil or fuel spill). (See Section 4.1)	Ensure implementation of appropriate mitigation measures. See Sections 5.1.	None expected
FO-7	Permanent flow dominated by flat morphology. Riparian vegetation comprised of maple, spruce and birch. Bankfull width = 12 m Wetted Width = 10 m Water Depth = 30 cm Substrate = Detritus and muck. A perched culvert has created an impoundment along the south side of Hogg Dam Road, with some water permeating through the road bed. See FO-8 for downstream description.	Permanent flow. Steep gradient and perched culvert downstream of road are impediments to upstream fish passage from the Montreal River. Fish bearing - cyprinids observed at road crossing	Installation of a fibre optic line within the existing and upgraded road beds (**Figure 2.3**).			
FO-8	Permanent flow dominated by riffle morphology downstream of Hogg Dam Road. Riparian vegetation comprised of birch, balsam fir and sugar maple. Bankfull width = 0.5 m Wetted Width = 0.4 m Water Depth = 3 cm Substrate = sand, cobble, gravel, detritus, muck and boulders. Steep gradient and low water levels likely create a barrier to fish movement. See FO-7 for upstream description.	Permanent flow. Fish are present approximately 225 m downstream from road in the Montreal River. Steep gradient and low water levels are impediments to fish passage from the Montreal River. Not fish bearing except in extreme lower reaches.	Installation of a fibre optic line within the existing and upgraded road beds (**Figure 2.3**).			

Table 3.2: Summary of Water Body Characteristics Within the 120 m Zone of Investigation

Reach ID[a]	Site Description[b]	Fish Bearing? (with rationale)	Proposed Works	Potential Impacts	Mitigation	Net Effects
FO-9	Permanent flow dominated by flat morphology. Riparian vegetation comprised of dogwood. Bankfull width = 8.0 m Wetted width = 5.0 m Water depth = 30 cm Substrate = Cobble, detritus, sand, gravel and boulder Flow from FO-10 reaches Hogg Dam Road and forms pools along the east side of Hogg Dam Road. Water drains from FO-9 via a culvert located slightly south of the confluence of FO-10 (i.e. the same culvert as FO-11). Cyprinid species were observed in this water body.	Permanent flow. Low water levels farther downstream impede fish passage from the Montreal River to this area. Cyprinid fish community observed at road crossing (i.e., fish bearing).	Installation of a fibre optic line within the existing and upgraded road beds (**Figure 2.3**).	Construction activities associated with installing the fibre optic line have the potential to affect water quality in downstream reaches through a temporary increase in surface water turbidity due to sediment runoff or the accidental release of a deleterious substance (e.g. oil or fuel spill). (See Section 4.1)	Ensure implementation of appropriate mitigation measures. See Sections 5.1.	None expected
FO-10	Permanent flow comprised of riffle, pool and run morphology upstream of Hogg Dam Road. Riparian vegetation dominated by sugar maple, yellow birch, balsam fir and cedar. Bankfull width = 0.7 m Wetted width = 0.5 m Water depth = 7 cm Substrate = sand, cobble, gravel, boulder and detritus Low water levels may create a seasonal barrier to fish movement; however, cyprinid species were observed in FO-9.	Permanent flow. Low water levels an impediment to fish passage into this water body. Cyprinid fish community observed in FO-9 along Hogg Dam Road. Fish bearing during high water levels.	Installation of a fibre optic line within the existing and upgraded road beds (**Figure 2.3**).			
FO-11	Permanent flow comprised of riffle, pool and run morphology (reach is downstream of Hogg Dam Road). Riparian vegetation dominated by sugar maple, yellow birch and balsam fir. Bankfull width = 1.0 m Wetted width = 0.3 m Water depth = 4 cm Substrate = sand, cobble, boulder and gravel This watercourse flows down a steep gradient and includes reaches of diffuse overland flow with no defined or visible channel. Surface flow may connect to fish bearing waters in downstream reaches during spring freshet and periods of high flow. Flow converges with FO-8 approx. 120 m west (downstream) of Hogg Dam Road.	Permanent flow. Fish are present upstream of Hogg Dam Road, but diffuse flow through ill-defined channels downstream likely isolates this population except during periods of high flows or spring freshet. Steep gradient and low water levels are impediments to upstream fish passage. Fish bearing.	Installation of a fibre optic line within the existing and upgraded road beds (**Figure 2.3**).			

Table 3.2: Summary of Water Body Characteristics Within the 120 m Zone of Investigation

Reach ID[a]	Site Description[b]	Fish Bearing? (with rationale)	Proposed Works	Potential Impacts	Mitigation	Net Effects
9B-5	Permanent flow along east side of Hogg Dam Road. Very shallow. Surface flow and channel definition disappears approximately 5 m downstream (west) of Hogg Dam Road. Hogg Dam Road culvert perched by approximately 30 cm. Riparian area dominated by deciduous trees. Bankfull width = 0.7 m Wetted width = 0.6 m Water depth = 10 cm Substrate = Gravel, sand, cobble, detritus, and boulder	Permanent flow. Low water level, diffuse flow and perched culvert are impediments to fish passage. Surface flow infiltrates downstream of road, therefore upper reaches in vicinity of road are disconnected from downstream fish community in Montreal River. Likely not fish bearing.	Installation of a fibre optic line within the existing and upgraded road beds (**Figure 2.3**).	Construction activities associated with installing the fibre optic line have the potential to affect water quality in downstream reaches through a temporary increase in surface water turbidity due to sediment runoff or the accidental release of a deleterious substance (e.g. oil or fuel spill). (See Section 4.1)	Ensure implementation of appropriate mitigation measures. See Sections 5.1.	None expected
9B-4 (Montreal River)	Permanent flow dominated by run morphology. Embayment of Montreal River. Riparian area dominated by steep slopes and mature trees. Bankfull width = 235 m Wetted width = 235 m Water depth = > 2 m Substrate (at shore) = Cobble, sand, boulder, muck, and detritus MNR data indicates the presence of Lake Trout in Montreal River. At its closest point, the fibre optic line will be located approx. 60 m from the Montreal River.	Permanent flow. No barriers to fish movement. Fish community present in the Montreal River.	Installation of a fibre optic line within the existing and upgraded road beds (**Figure 2.3**).			
9B-1	Downstream of 9B-2 and 9B-3 on west side of Hogg Dam Road Permanent flow dominated by riffle and run morphology. Occasional undercut banks. Riparian area dominated by sugar maple and ferns. Bankfull width = 2.5 m Wetted width = 1.2 m Water depth = 20 cm Substrate = Cobble, gravel, sand, boulder and detritus.	Permanent flow. No barriers to fish passage. Brook Trout captured at road crossing. Fish bearing.	Installation of a fibre optic line within the existing and upgraded road beds (**Figure 2.3**).			
9B-2	Intermittent flow. Isolated pools observed during field investigations. Pools contained floating pondweed. Riparian area dominated by yellow birch. Short tributary that flows into FO-12/9B-1. Bankfull width = 0.3 m Wetted width = 0.3 m Water depth = 5 cm Substrate = Sand, gravel, and silt Culvert under Hogg Dam Road.	Intermittent flow. No barriers to fish passage. Fish are present approximately 10 m downstream at 9B-1. Fish bearing (likely seasonally).	Installation of a fibre optic line within the existing and upgraded road beds (**Figure 2.3**).			

Table 3.2: Summary of Water Body Characteristics Within the 120 m Zone of Investigation

Reach ID[a]	Site Description[b]	Fish Bearing? (with rationale)	Proposed Works	Potential Impacts	Mitigation	Net Effects
9B-3	Intermittent flow. Dry during field investigations. Riparian area dominated by eastern white cedar, yellow birch. Short tributary that flows into FO-12/9B-1. Bankfull width = 0.6 m Substrate = Sand, gravel, silt, and cobble Culvert under Hogg Dam Road.	Intermittent flow. Dry during field investigations. Fish are present approximately 5 m downstream at 9B-1. Fish bearing (likely seasonally).	Installation of a fibre optic line within the existing and upgraded road beds (**Figure 2.3**).	Construction activities associated with installing the fibre optic line have the potential to affect water quality in downstream reaches through a temporary increase in surface water turbidity due to sediment runoff or the accidental release of a deleterious substance (e.g. oil or fuel spill). (See Section 4.1)	Ensure implementation of appropriate mitigation measures. See Sections 5.1. .	None expected
FO-12	Upstream of 9B-2 and 9B-3, FO-12 crosses Hogg Dam Road and flows into 9B-1. Permanent flow comprised of riffle, pool and run morphology. Riparian habitat dominated by sugar maple, birch and balsam fir. Bankfull width = 4.0 m Wetted width = 3.0 m Water depth = 10 cm Substrate = sand, cobble, gravel, boulder and bedrock Likely provides spawning and nursery habitat for fish. Culvert under Hogg Dam Road.	Permanent flow. No barriers to fish passage. Brook Trout captured at road crossing. Fish bearing.	Installation of a fibre optic line within the existing and upgraded road beds (**Figure 2.3**).			
10-22	Permanent pond located on north side of McKay Road, west of reach 10-14. Dimensions approximately 30 m by 15 m. Mean depth is 30 cm. Riparian area dominated by herbaceous plants and shrubs. No water body is present on the south side of MacKay Road opposite the pond. No culvert under road.	Permanent, isolated pond. Disconnected from downstream fish community. Not fish bearing .	Installation of a fibre optic line within the existing and upgraded road beds (**Figure 2.4**).			
10-14	Permanent pond located on north side of McKay Road, within road allowance. Site is east of reach 10-22. Dimensions approximately 10 m by 15 m. Mean depth is 1.5 m. Predominantly soft substrate. *Potamogeton* sp. observed. Bedrock ridge creates dam impeding or preventing fish passage. Additionally, there is no defined channel downslope of the feature. . Riparian area dominated by herbaceous plants and shrubs. Iron staining observed, suggesting possible groundwater discharge. Culvert under McKay Road (conveys directed overland flow – no defined channel on north or south side of road)	Permanent isolated pond. Disconnected from downstream fish community by bedrock ridge. Likely not fish bearing.	Installation of a fibre optic line within the existing and upgraded road beds (**Figure 2.4**)			

Table 3.2: Summary of Water Body Characteristics Within the 120 m Zone of Investigation

Reach ID[a]	Site Description[b]	Fish Bearing? (with rationale)	Proposed Works	Potential Impacts	Mitigation	Net Effects
FO-17 (Montreal River)	Permanent flow in bay to Montreal River dominated by flat morphology. Riparian vegetation consists of a mixed forest, dominated by spruce. Bankfull width = 70 m Wetted width = 70 m Water depth = not available Substrate = inaccessible due to steep slopes Bay provides spawning, foraging and rearing habitat for a variety of fish species. MNR data indicates the presence of Lake Trout in Montreal River. At its closest point the fibre optic line will be located approx. 80 m from water body.	Permanent flow. Background data indicates the Montreal River is fish bearing.	Installation of a fibre optic line within the existing and upgraded road beds (**Figure 2.4**).	Construction activities associated with installing the fibre optic line have the potential to affect water quality in downstream reaches through a temporary increase in surface water turbidity due to sediment runoff or the accidental release of a deleterious substance (e.g. oil or fuel spill). (See Section 4.1)	Ensure implementation of appropriate mitigation measures. See Sections 5.1.	None expected
FO-16	Located downstream of McKay Road, FO-16 consists of permanent flow dominated by riffle morphology. Riparian area comprised of sugar maple, birch and balsam fir. Bankfull width = 3.0 m Wetted width = 0.2 m Water depth = 5 cm Substrate = sand and gravel Low water levels may result in seasonal migratory obstructions for fish Culvert under McKay Road.	Permanent flow. Low water levels an impediment to fish passage. Fish are present approximately 120m downstream from road in the Montreal River. Not fish bearing except in extreme lower reaches.	Installation of a fibre optic line within the existing and upgraded road beds (**Figure 2.4**).			
10-29	Intermittent flow. Channel morphology dominated by pools. Riparian area dominated by sugar maple and ferns. Bankfull width = 1.5 m Wetted width = 0.4 m Water depth = 2 cm Substrate = Gravel, detritus, cobble, and sand Connects to culvert under McKay Road at FO-16.	Intermittent flow. Low water levels an impediment to fish passage. Fish are present approximately 120 m downstream from road in the Montreal River. Not likely fish bearing.	Installation of a fibre optic line within the existing and upgraded road beds (**Figure 2.4**).			

Table 3.2: Summary of Water Body Characteristics Within the 120 m Zone of Investigation

Reach ID[a]	Site Description[b]	Fish Bearing? (with rationale)	Proposed Works	Potential Impacts	Mitigation	Net Effects
10-27	Permanent flow dominated by run morphology. Culvert perched by approximately 40 cm at McKay Road. Riparian area dominated by sugar maple and yellow birch. Bankfull width = 2 m Wetted width = 0.7 m Water depth = 8 cm Substrate = Cobble, sand, gravel, and detritus Perched culvert under McKay Road.	Permanent flow. Perched culvert at McKay road an impediment to fish passage. Not likely fish bearing.	Installation of a fibre optic line within the existing and upgraded road beds (**Figure 2.4**).	Construction activities associated with installing the fibre optic line have the potential to affect water quality in downstream reaches through a temporary increase in surface water turbidity due to sediment runoff or the accidental release of a deleterious substance (e.g. oil or fuel spill). (See Section 4.1)	Ensure implementation of appropriate mitigation measures. See Sections 5.1.	None expected
10-28	Seep originating from side of steep slope. Permanent flow is not channelized and disappears underground before crossing under McKay Road.	Permanent flow. Fish are present in the Montreal River approximately 120 m downstream from road. Steep gradient and underground flow are impediment to fish passage upstream from the Montreal River. Not fish bearing.	Installation of a fibre optic line within the existing and upgraded road beds (**Figure 2.4**).			
FO-15	Permanent flow dominated by riffle morphology. Riparian vegetation comprised of sugar maple, birch and balsam fir. Bankfull width = 0.5 m Wetted width = 0.3 m Water depth = 3 cm Substrate = sand, gravel and cobble Steep gradient of watercourse likely provides barrier to upstream passage of fish.	Permanent flow. Fish are present in the Montreal River approximately 120 m downstream from road. Steep gradient is an impediment to fish passage upstream from the Montreal River. Not likely fish bearing.	Installation of a fibre optic line within the existing and upgraded road beds (**Figure 2.4**).			

Table 3.2: Summary of Water Body Characteristics Within the 120 m Zone of Investigation

Reach ID[a]	Site Description[b]	Fish Bearing? (with rationale)	Proposed Works	Potential Impacts	Mitigation	Net Effects
10-25	Permanent flow dominated by riffle and run morphology. Undercut banks observed during field investigations. Culvert at McKay Road perched by approximately 30 cm. Riparian area dominated by mountain maple, yellow birch, and sugar maple. Bankfull width = 4.5 m Wetted width = 2.5 m Substrate = Cobble, gravel, sand, and boulder	Permanent flow. Perched culvert an impediment to upstream fish passage, upstream of McKay Road. Brook Trout captured just downstream of McKay Road. Fish bearing.	Installation of a fibre optic line within the existing and upgraded road beds (**Figure 2.4**).	Construction activities associated with installing the fibre optic line have the potential to affect water quality in downstream reaches through a temporary increase in surface water turbidity due to sediment runoff or the accidental release of a deleterious substance (e.g. oil or fuel spill). (See Section 4.1)	Ensure implementation of appropriate mitigation measures. See Sections 5.1.	None expected
FO-14	Flow from 10-25 empties into reach FO-14 immediately downstream of McKay Road. Permanent flow comprised of riffle, pool, run and flat morphology. Riparian vegetation dominated by sugar maple, birch and balsam fir. Bankfull width = 2.0 m Wetted width = 1.5 m Water depth = 8 cm Substrate = Gravel, sand and cobble Perched culvert (approximately 30 cm) at McKay Road. Watercourse provides spawning habitat for fish.	Permanent flow. Perched culvert an impediment to upstream fish passage at McKay Road. Brook Trout captured in upstream reaches. Fish bearing.	Installation of a fibre optic line within the existing and upgraded road beds (**Figure 2.4**).			
FO-13 (Montreal River)	Permanent flow dominated by flat morphology. Riparian vegetation comprised of a mixed forest. Bankfull width = 50 m Wetted width = 50 m Water depth = 30 cm Substrate = Detritus and muck This bay along the Montreal River provides ideal spawning habitat for Northern Pike and nursery habitat for young of the year Northern Pike and small-bodied fish species. Cyprinidae species were observed near the shoreline. MNR data indicates the presence of Lake Trout in the Montreal River. Fibre optic line to be located within MacKay Road, approx. 50 m upstream of FO-13.	Permanent flow. Background data indicates the Montreal River is fish bearing.	Installation of a fibre optic line within the existing and upgraded road beds (**Figure 2.4**).			

Table 3.2: Summary of Water Body Characteristics Within the 120 m Zone of Investigation

Reach ID[a]	Site Description[b]	Fish Bearing? (with rationale)	Proposed Works	Potential Impacts	Mitigation	Net Effects
FO-18 (Montreal River)	Permanent flow in side bay of Montreal River dominated by flat morphology. Riparian vegetation consists of a mixed forest, dominated by spruce. Bankfull width = 200 m Wetted width = 200 m Water depth = not available Substrate = Sand, gravel and cobble Young-of-year fish observed near shoreline, provides spawning, forage and rearing habitat for fish. MNR data indicates the presence of Lake Trout in the Montreal River. At its closest point the fibre optic cable will be located approx. 60 m south of FO-18 within the MacKay Road bed.	Permanent flow. FO-18 directly connected to the Montreal River. Fish bearing.	Installation of a fibre optic cable within the existing and upgraded road beds (**Figure 2.4**).	Construction activities associated with installing the fibre optic cable have the potential to affect water quality in downstream reaches through a temporary increase in surface water turbidity due to sediment runoff or the accidental release of a deleterious substance (e.g. oil or fuel spill). (See Section 4.1)	Ensure implementation of appropriate mitigation measures. See Sections 5.1.	None expected

a see Figures 2.1 to 2.4 (**Appendix A**)
b summary of the surveyed reach. Substrate listed in order of dominance. At locations where no fish community information is reported (i.e. neither MNR or Stantec data), sampling was not conducted due to habitat or morphological limitations.
c assumes all mitigation measures are properly implemented and successful

3.2 ASSESSMENT SUMMARY FOR FISH BEARING WATER BODIES

Installation of the fibre optic line will occur entirely within the road beds of the Dump Road, Hogg Dam Road and MacKay Road and will not involve any watercourse crossings, culvert works, or in-water work; hence, no impacts to the water bodies or fish are anticipated as a result of fibre optic line installation provided appropriate mitigation and environmental protection measures are properly implemented. Potential general construction-related impacts are described in **Section 4.1**. The 50 m section of fibre optic line to be installed within the entrance or exit roads to Great Lakes Power's Gartshore TS from MacKay Road does not intersect any water bodies.

The predicted net effects presented in **Table 3.2** assume that, based on the proper implementation of the proposed mitigation measures, potential negative effects associated with the installation of the fibre optic line will be fully mitigated.

4.0 Overview of Potential Impacts

4.1 DESCRIPTION OF PROJECT ACTIVITIES

The fibre optic communications line will be installed within the road beds or road shoulders of Dump Road, Hogg Dam Road and MacKay Road. A HDPE conduit of approximately 32 mm diameter will be placed in a narrow trench excavated in the road beds at a depth of approximately 60 cm below grade. Crossings of water body culverts in the road beds will be completed by excavating the trench on both sides and below the culvert, then feeding the conduit under the culvert. The culverts will remain secured in-place and will be supported by unexcavated road bed material on each side of the excavated trench.

In the unlikely event that this preferred construction method is not feasible, contingency measures may be used in site-specific locations. Contingency measures will be drawn from best management practices and may include punch and bore or directional drilling, with mitigation measures as presented in Section 5.4 of the Bow Lake Wind Farm Water Assessment and Water Body Report (Stantec, 2013a).

Once the conduit is installed, the fibre optic line will then be pulled through the conduit and connected to the Project TS and the Bell connection point. The trench will be back-filled with excavated material as the installation progresses, compacted to avoid settling or slumping, and graded with clean gravel material. All construction and installation activities will be completed from the road surfaces. Detailed design work is currently underway and will determine the preferred location within the existing and upgraded road beds. The fibre optic line will also connect to Great Lakes Power's Gartshore TS located on MacKay Road. The line will be installed underground within the existing entrance or exit roads to the Gartshore TS for a distance of approximately 50 m from MacKay Road. Discussions with the MNR will be necessary to determine specific crown land permitting requirements.

4.2 CONSTRUCTION-RELATED IMPACTS

Fibre optic line installation activities within the existing road beds and within 120 m of water bodies may result in the following effects:

- Short-term increase in turbidity from runoff and soil erosion during construction;
- Impairment of water quality (introduction of contaminants); and
- Disturbance effects to aquatic habitat.

These potential effects can be fully mitigated with proper implementation of the mitigation and monitoring measures presented in **sections 5.0 and 6.0**.

5.0 Standard Mitigation Measures for Working Around Water

Standard mitigation measures used for works in and around water are summarized below and are based on the current approach to installation of the fibre optic line within the existing road beds. The extent of mitigation required will be dependent on detailed design considerations, technical requirements, and schedule. Mitigation measures for contingency measures such as punch and bore and directional drilling are presented in Section 5.4 of the original Bow Lake Wind Farm Water Assessment and Water Body Report.

There are many standard and effective mitigation measures to protect water quality, fish and fish habitat from potential effects during installation of the fibre optic line. General mitigation measures for construction activities near a water body in the ZOI include:

- All materials and equipment used for the purpose of fibre optic line installation shall be operated and stored in a manner that prevents any deleterious substance (e.g., petroleum products, silt, etc.) from entering the water:
  - Any stockpiled materials (if required) shall be stored and stabilized away from the water;
  - Refuelling and maintenance of construction equipment shall occur a minimum of 30 m from a water body;
  - Accidental spills shall be reported immediately to the MOE Spills Action Centre and MNR.
- Sediment and erosion control measures shall be implemented prior to construction and maintained during the construction phase to prevent entry of sediment into the water:
  - Silt fencing and/or barriers shall be used along all construction areas adjacent to sensitive areas (e.g. water bodies, wetlands);
  - No equipment will be permitted to enter any natural areas beyond the silt fencing during installation of the fibre optic line;
  - All sediment and erosion control measures shall be inspected by the Construction Supervisor twice per week and during and immediately following rainfall events to ensure that they are functioning properly and are maintained and/or upgraded as required;
  - If the sediment and erosion control measures are not functioning properly, no further work shall occur until the sediment and/or erosion problem is addressed;
  - All disturbed areas of the construction site (road beds) should be stabilized as soon as practicable once construction is complete in the area;
  - Sediment and erosion control measures should be left in place until all construction in the area is complete and the roads have been re-graded to pre-disturbance contours; and

- Care must be taken while excavating the road beds in the vicinity of culverts to avoid damage or puncher. When required, final excavation should be completed by hand tools to avoid physical disturbance or damage to the culvert.

6.0 Monitoring

6.1 CONSTRUCTION (AS OUTLINED IN THE CONSTRUCTION PLAN REPORT AND DESIGN AND OPERATIONS REPORT)

Methodologies/Sampling Protocols

The Construction Supervisor will be on-site during installation of the fibre optic line to ensure compliance with specifications, site plans and permits/authorizations. In particular, the Construction Supervisor will ensure that pre-construction preparation is completed (e.g. erosion and sediment control measures) prior to commencement of work near a water body. The Construction Supervisor will monitor the implementation of proposed mitigation measures and:

- Perform routine checks (i.e., twice per week and during and after rain events) of all erosion and sediment control measures and repair as appropriate;
- Regularly inspect equipment and materials for fluid spills/leaks and ensure an appropriate supply of spill containment and clean-up materials are on-hand.

Performance Objectives/Additional Actions

Environmental monitoring will be on-going throughout installation of the fibre optic line. A visual inspection will be completed following spring run-off the year after construction to ensure installation of the fibre optic line within the road beds hasn't altered surface drainage patterns and that the road beds are stable. In the event of adverse effects, appropriate remedial measures will be completed as necessary (i.e., road rehabilitation) and additional follow-up monitoring conducted as appropriate.

6.2 OPERATION AND MAINTENANCE

The Environmental Effects Monitoring Plan for the Bow Lake Wind Farm is provided in the Design and Operations Report (Stantec, 2013d). Operation of the fibre optic line has no potential to affect water quality or the aquatic environments. Maintenance activities that have the potential to affect aquatic habitat includes accidental spills and/or leaks from road maintenance vehicles. Proper storage of materials (e.g. maintenance fluids) at off-site storage containers and proper maintenance of vehicles will greatly reduce the potential for accidental spills and/or leaks. In the event of an accidental spill and/or leak appropriate remedial measures will be completed as necessary and additional follow-up monitoring conducted as appropriate. The level of follow-up monitoring and reporting should be based on the severity of the spill/leak and will be discussed with the MOE and MNR. Appropriate containment facilities will be installed for fuel storage and emergency response materials (e.g., spill kits) will be maintained on-site as

required. Refuelling, equipment maintenance, and other potentially contaminating activities will occur only in designated areas and at least 30 m from a water body.

In the event of an accidental discharge of fluids associated with road maintenance, the wind farm Operation and Maintenance personnel will immediately stop work, identify the source of discharge and rectify the accidental spill. Once the spill is stopped and contained, the extent of the contamination will be assessed and any contaminated soil will be removed and disposed of it in accordance with the current appropriate provincial legislation, such as Ontario Regulation 347. Areas affected by accidental spills will be restored to a safe and clean condition using native materials in accordance with MNR requirements.

In the event of a spill reaching a waterbody, containment booms will be deployed and the contained fluids will be removed from the water surface by vacuum truck or other appropriate method. Any contaminated shoreline soils or sediments will be removed and disposed of in accordance with applicable provincial legislation and as determined in consultation with the MNR, MOE, and DFO as required.

The Emergency Response Plan (see the Design and Operations Report) does contain procedures for spill contingency and response plans, spill response training, notification procedures, and necessary clean-up materials and equipment. As per s.13, 15 and 92 of the *Environmental Protection Act*, all releases that could potentially have an adverse environmental effect, or are in excess of prescribed regulatory levels will be reported to the MOE's Spills Action Centre and MNR.

7.0 Conclusions

This Bow Lake Wind Farm 'Water Assessment and Water Body Report – Modification Document' has been prepared by Stantec for the Proponent in accordance with Ontario Regulation 359/09.

Locations where water bodies are present in or within 120 m of the revised Project Location for the fibre optic line are presented in Figures 2.1 to 2.4. Aquatic habitat characteristics at each location are summarized in **Table 3.2**. The designation of various features as water bodies was determined by field staff based on field conditions at the time of the survey and the definition of water body provided in O. Reg. 359/09.

The proposed location of the fibre optic line is within the road beds of the Dump Road, Hogg Dam Road and MacKay Road) and the 50 m section of line required to connect to Great Lakes Power's Gartshore TS from MacKay Road. Assuming proper implementation of the proposed environmental protection, mitigation and monitoring measures, it is anticipated that installation of the line (including all construction activities) will be in compliance with the *Fisheries Act*, and will not result in harmful effects to fish or water bodies. No new potential effects and associated mitigation measures have been identified outside of those originally considered in the Bow Lake Wind Farm Water Assessment and Water Body Report (Stantec, 2013a) and the REA Application.

This report has been prepared by Stantec for the sole benefit of the Proponent, and may not be used by any third party without the express written consent of the Proponent. The data presented in this report are in accordance with Stantec's understanding of the Project as it was presented at the time of reporting.

8.0 References

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Stantec. 2013b. Bow Lake Wind Farm Natural Heritage Report (NHA) and Environmental Impact Study (EIS). January, 2013.

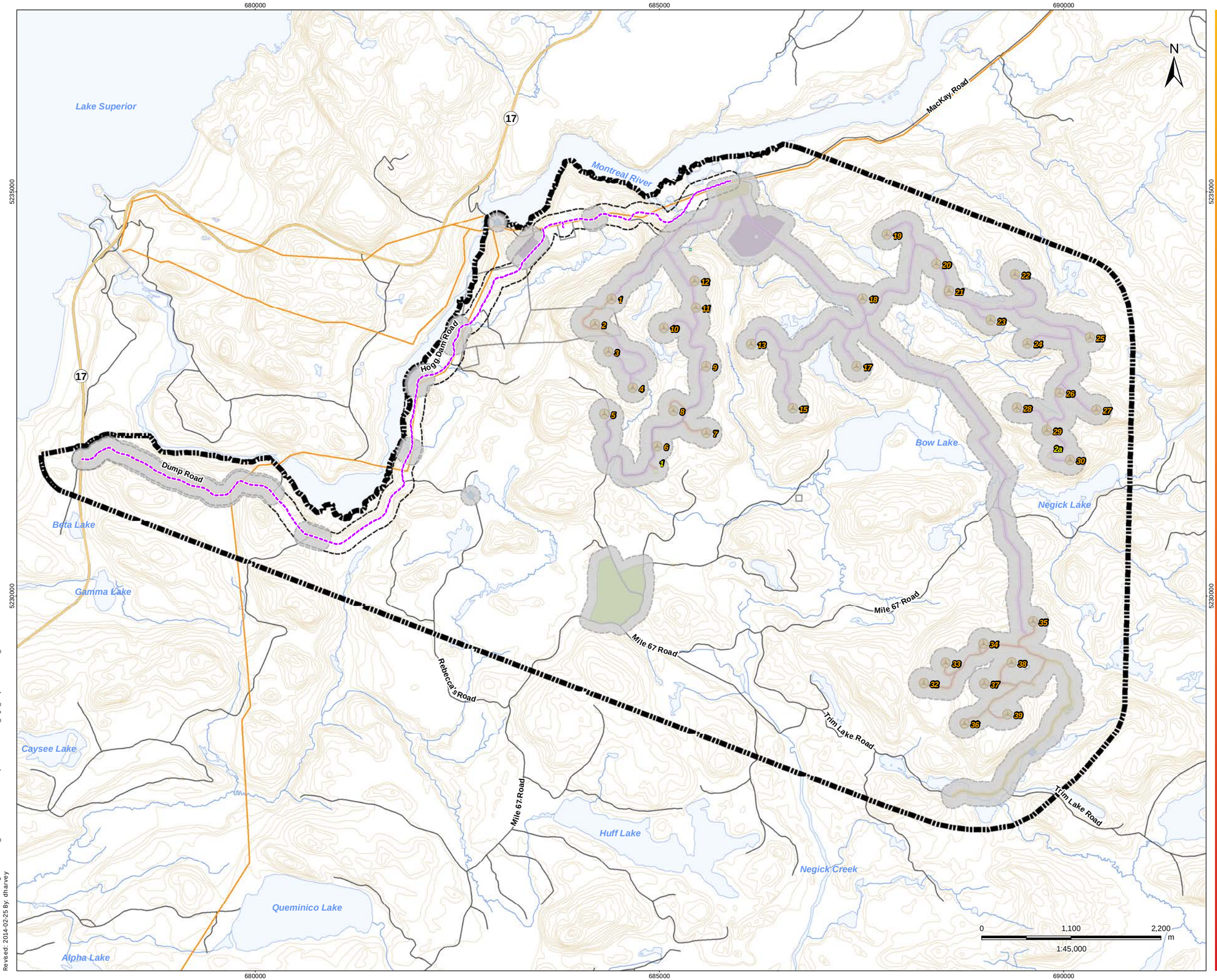
Stantec. 2013c. Bow Lake Wind Farm Natural Heritage Assessment and Environmental Impact Study – Modification Document (Fibre Optic Line). January 2014.

Stantec. 2013d. Bow Lake Wind Farm Design and Operations Report. January. 2013.

Stantec. 2013e. Bow Lake Wind Farm Consultation Report. January, 2013.

Appendix A:

Figures



Stantec

Legend

- Study Area
- Fiber Optic Cable 120m Zone of Investigation
- Previously Assessed 120m Zone of Investigation
- Fibre Optic Line/ Project Location

Previously Assessed Project Components

- Turbine Location
- Gate Location
- Meteorological Tower
- Proposed Water Extraction Location
- Access Road (New)
- Access Road (Upgrade)
- Overhead/Underground Collector Line
- Access Road Corridor
- Collector Line Corridor
- Construction Compound
- Construction Compound & Welfare Building
- Construction Compound & Transformer Station/Operations & Maintenance Building

Existing Features

- Expressway / Highway
- Road
- Elevation Contour
- Existing Transmission Line
- Watercourse
- Waterbody
- Patent Land

Notes

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February 2014
160960771

Client/Project
Bow Lake Wind Farm
Nodin Kitagan Limited Partnership and Nodin Kitagan 2 Limited Partnership, through their General Partners Shongwish Nodin Kitagan GP Corp. and Shongwish Nodin Kitagan 2 GP Corp.

Figure No.
1.0

Title
Project Location & Study Area - Overview

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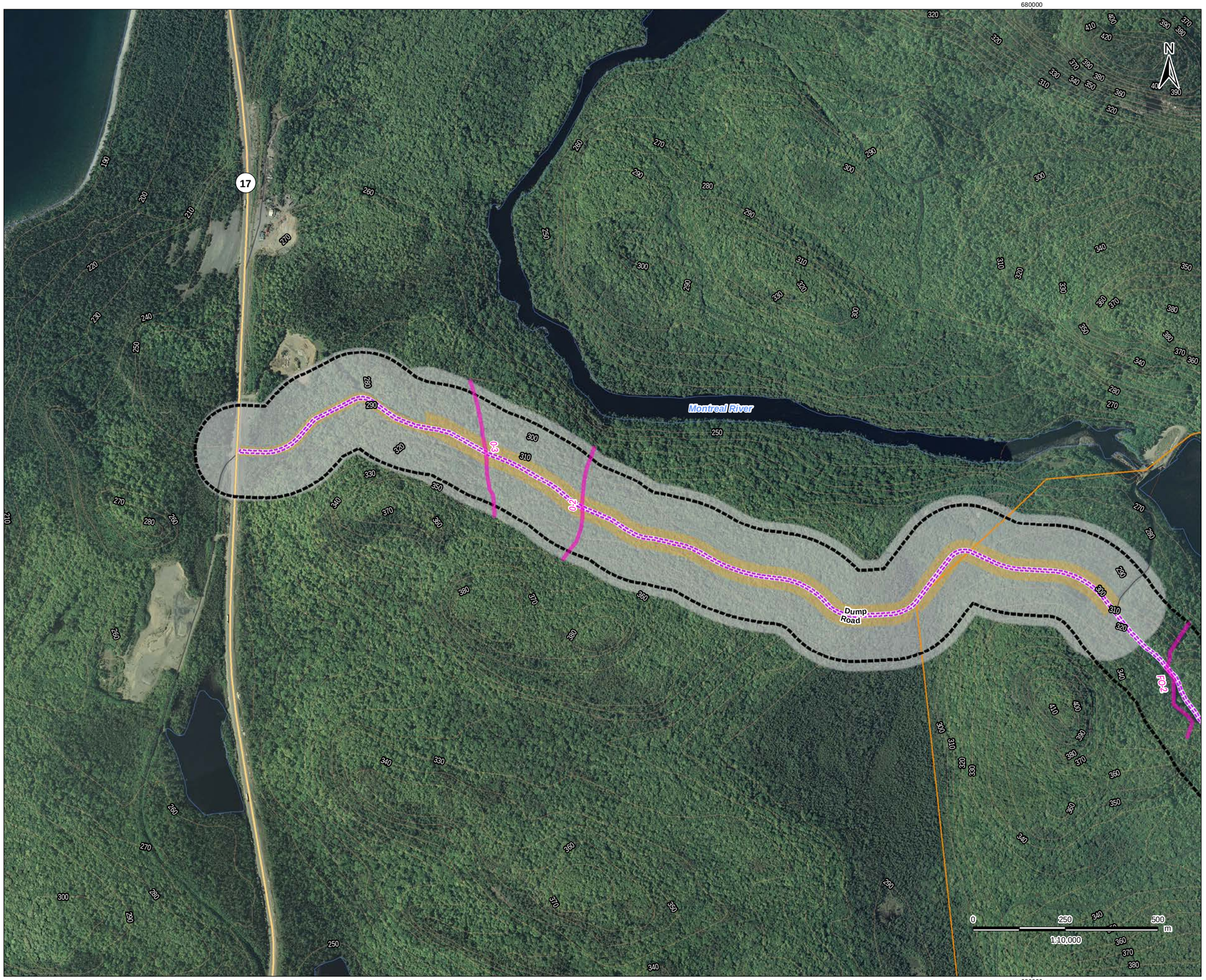
Revised: 2014-02-25 By: dharvey



Stantec

Legend

- 120m Zone of Investigation
- Previously Assessed 120m Zone of Investigation
- Fibre Optic Line Location

Previously Assessed Project Components

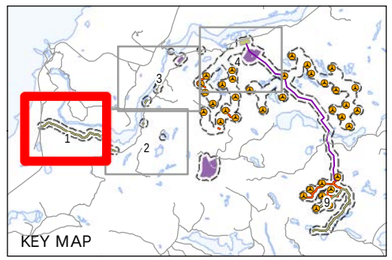
- Turbine Location
- Gate Location
- Meteorological Tower
- Proposed Water Extraction Location
- Access Road (New)
- Access Road (Upgrade)
- Overhead/Un... Collector Line
- Access Road Corridor
- Collector Line Corridor
- Construction Compound
- Construction Compound & Welfare Building
- Construction Compound & Transformer Station/Operations & Maintenance Building

Existing Features

- Expressway / Highway
- Road
- Elevation Contour
- Existing Transmission Line
- Watercourse
- Waterbody
- Patent Land

Water Bodies

- REA Water Body
- Not a REA Water Body



Notes

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March 2014
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Client/Project

Bow Lake Wind Farm
Nodin Kitagan Limited Partnership and Nodin Kitagan 2 Limited Partnership, through their General Partners Shongwish Nodin Kitagan GP Corp. and Shongwish Nodin Kitagan 2 GP Corp.

Figure No.

2.1

Title

Water Body Assessment

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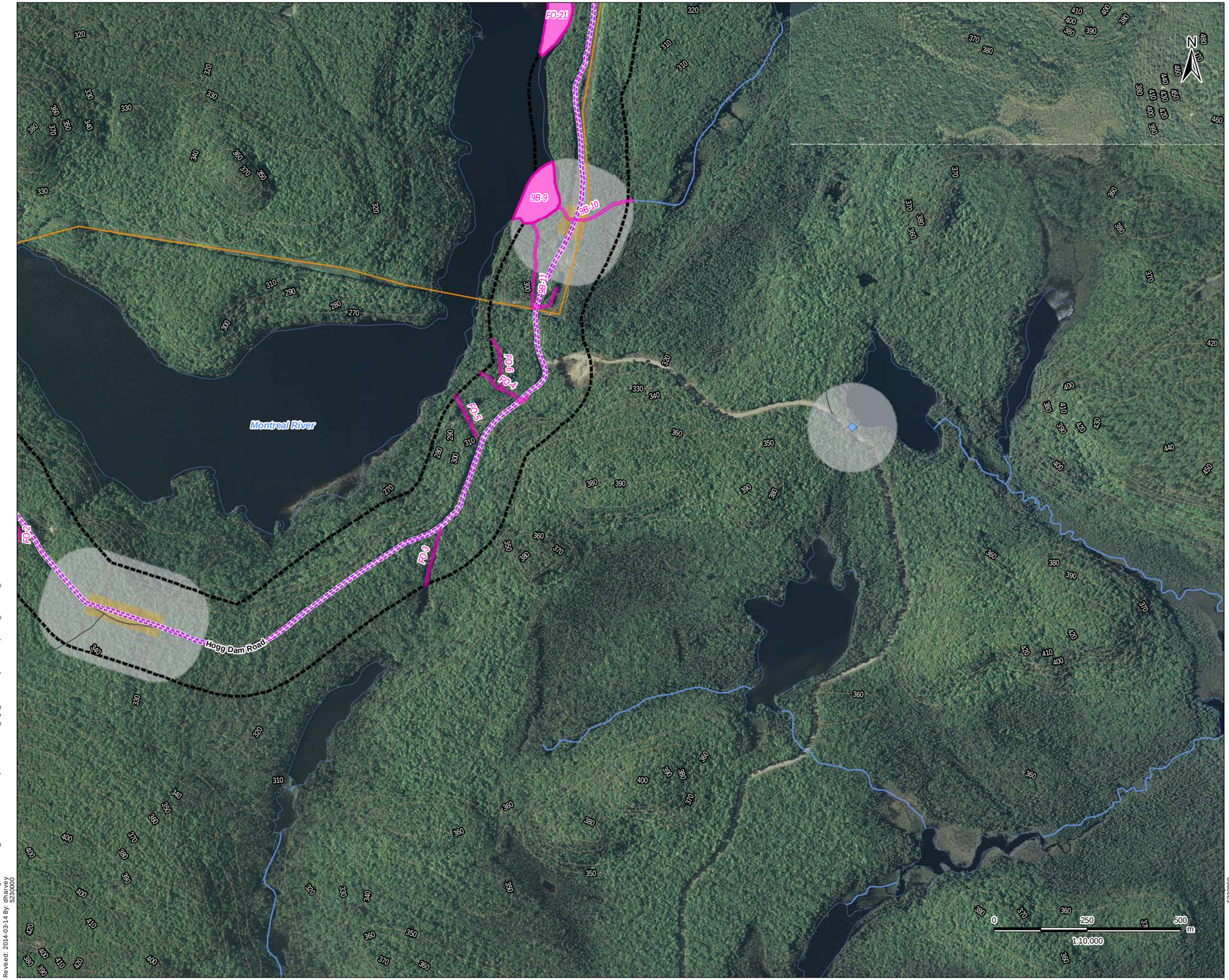
Revised: 2014-03-14 By: dharvey



Stantec

Legend

- 120m Zone of Investigation
- Previously Assessed 120m Zone of Investigation
- Fibre Optic Line Location

Previously Assessed Project Components

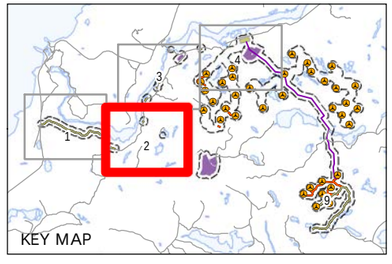
- Turbine Location
- Gate Location
- Meteorological Tower
- Proposed Water Extraction Location
- Access Road (New)
- Access Road (Upgrade)
- Overhead/Un... Collector Line
- Access Road Corridor
- Collector Line Corridor
- Construction Compound
- Construction Compound & Welfare Building
- Construction Compound & Transformer Station/Operations & Maintenance Building

Existing Features

- Expressway / Highway
- Road
- Elevation Contour
- Existing Transmission Line
- Watercourse
- Waterbody
- Patent Land

Water Bodies

- REA Water Body
- Not a REA Water Body



Notes

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March 2014
160960771

Client/Project
Bow Lake Wind Farm
Nodin Kitagan Limited Partnership and Nodin Kitagan 2 Limited Partnership, through their General Partners Shongwish Nodin Kitagan GP Corp. and Shongwish Nodin Kitagan 2 GP Corp.

Figure No.
2.2

Title
Water Body Assessment

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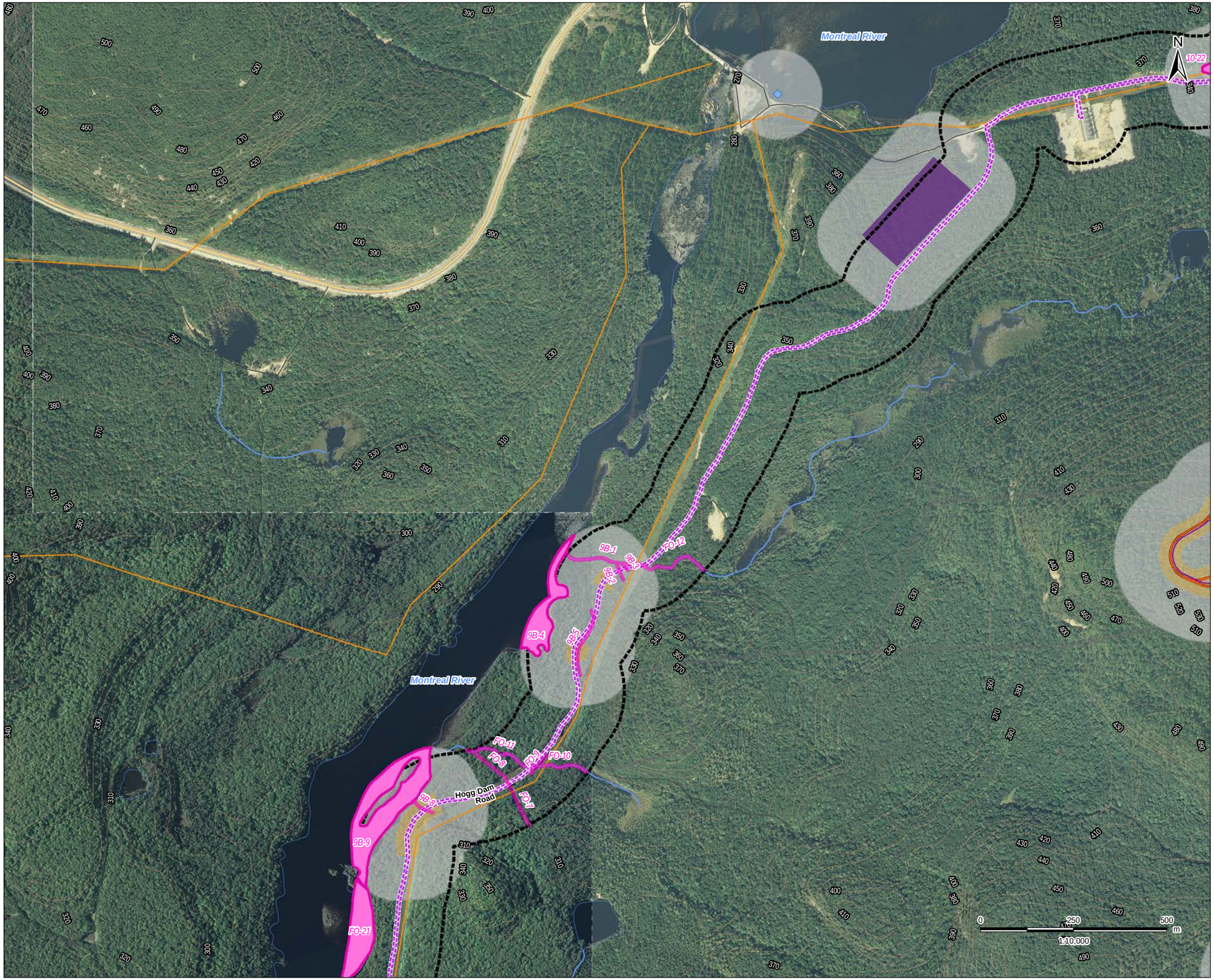
Revised: 2014-03-14 By: dharvey



Stantec

Legend

- 120m Zone of Investigation
- Previously Assessed 120m Zone of Investigation
- Fibre Optic Line Location

Previously Assessed Project Components

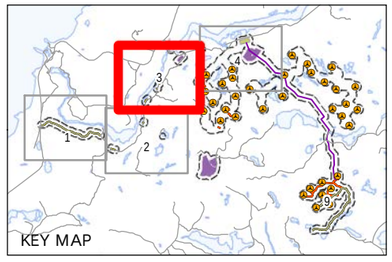
- Turbine Location
- Gate Location
- Meteorological Tower
- Proposed Water Extraction Location
- Access Road (New)
- Access Road (Upgrade)
- Overhead/Un... Collector Line
- Access Road Corridor
- Collector Line Corridor
- Construction Compound
- Construction Compound & Welfare Building
- Construction Compound & Transformer Station/Operations & Maintenance Building

Existing Features

- Expressway / Highway
- Road
- Elevation Contour
- Existing Transmission Line
- Watercourse
- Waterbody
- Patent Land

Water Bodies

- REA Water Body
- Not a REA Water Body



Notes

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Client/Project

Bow Lake Wind Farm
Nodin Kitagan Limited Partnership and Nodin Kitagan 2 Limited Partnership, through their General Partners Shongwish Nodin Kitagan GP Corp. and Shongwish Nodin Kitagan 2 GP Corp.

Figure No.
2.3

Title

Water Body Assessment

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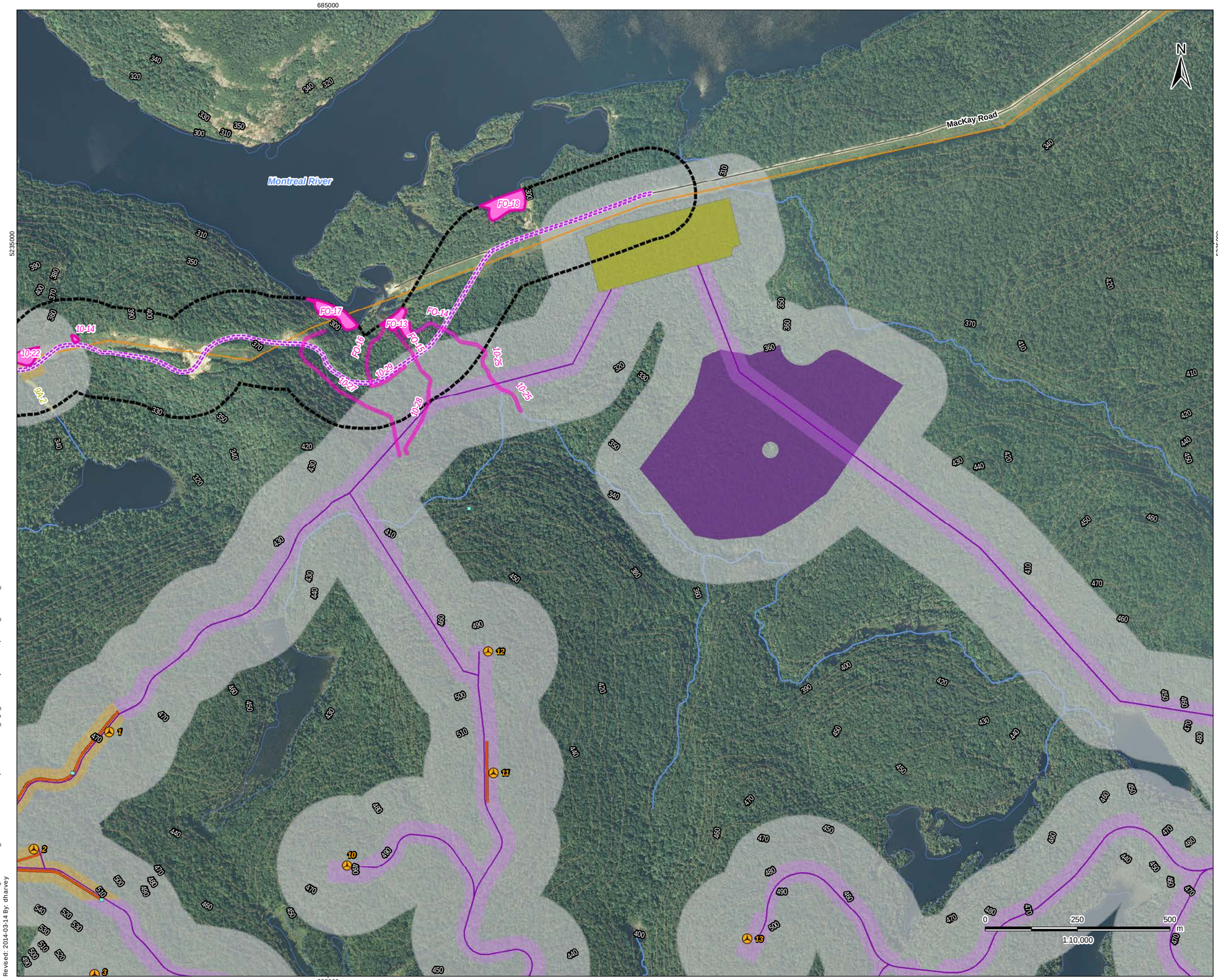
Revised: 2014-03-14 By: dharvey



Stantec

Legend

- 120m Zone of Investigation
- Previously Assessed 120m Zone of Investigation
- Fibre Optic Line Location

Previously Assessed Project Components

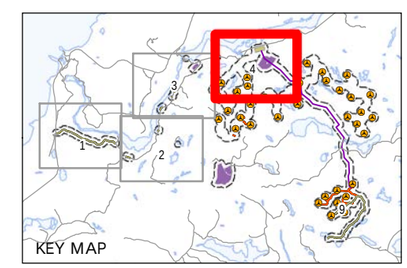
- Turbine Location
- Gate Location
- Meteorological Tower
- Proposed Water Extraction Location
- Access Road (New)
- Access Road (Upgrade)
- Overhead/Un... Collector Line
- Access Road Corridor
- Collector Line Corridor
- Construction Compound
- Construction Compound & Welfare Building
- Construction Compound & Transformer Station/Operations & Maintenance Building

Existing Features

- Expressway / Highway
- Road
- Elevation Contour
- Existing Transmission Line
- Watercourse
- Waterbody
- Patent Land

Water Bodies

- REA Water Body
- Not a REA Water Body



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Client/Project
Bow Lake Wind Farm
Nodin Kitagan Limited Partnership and Nodin Kitagan 2 Limited Partnership, through their General Partners Shongwish Nodin Kitagan GP Corp. and Shongwish Nodin Kitagan 2 GP Corp.

Figure No.
2.4

Title
Water Body Assessment

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Revised: 2014-03-14 By: dharvey

Stantec

Legend

- 120m Zone of Investigation
- Previously Assessed 120m Zone of Investigation
- Fibre Optic Line Location

Previously Assessed Project Components

- Turbine Location
- Gate Location
- Meteorological Tower
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- Access Road (New)
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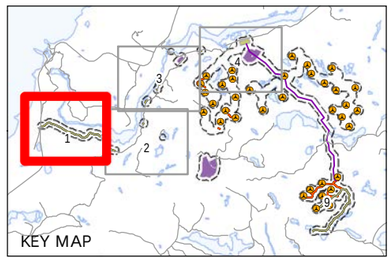
Existing Features

- Expressway / Highway
- Road
- Elevation Contour
- Existing Transmission Line
- Watercourse
- Waterbody
- Patent Land
- Fish Bearing Water Body



Notes

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Client/Project
Bow Lake Wind Farm
Nodin Kitagan Limited Partnership and Nodin Kitagan 2 Limited Partnership, through their General Partners Shongwish Nodin Kitagan GP Corp. and Shongwish Nodin Kitagan 2 GP Corp.

Figure No.
3.1

Title
Fish Bearing Water Bodies in the Zone of Investigation

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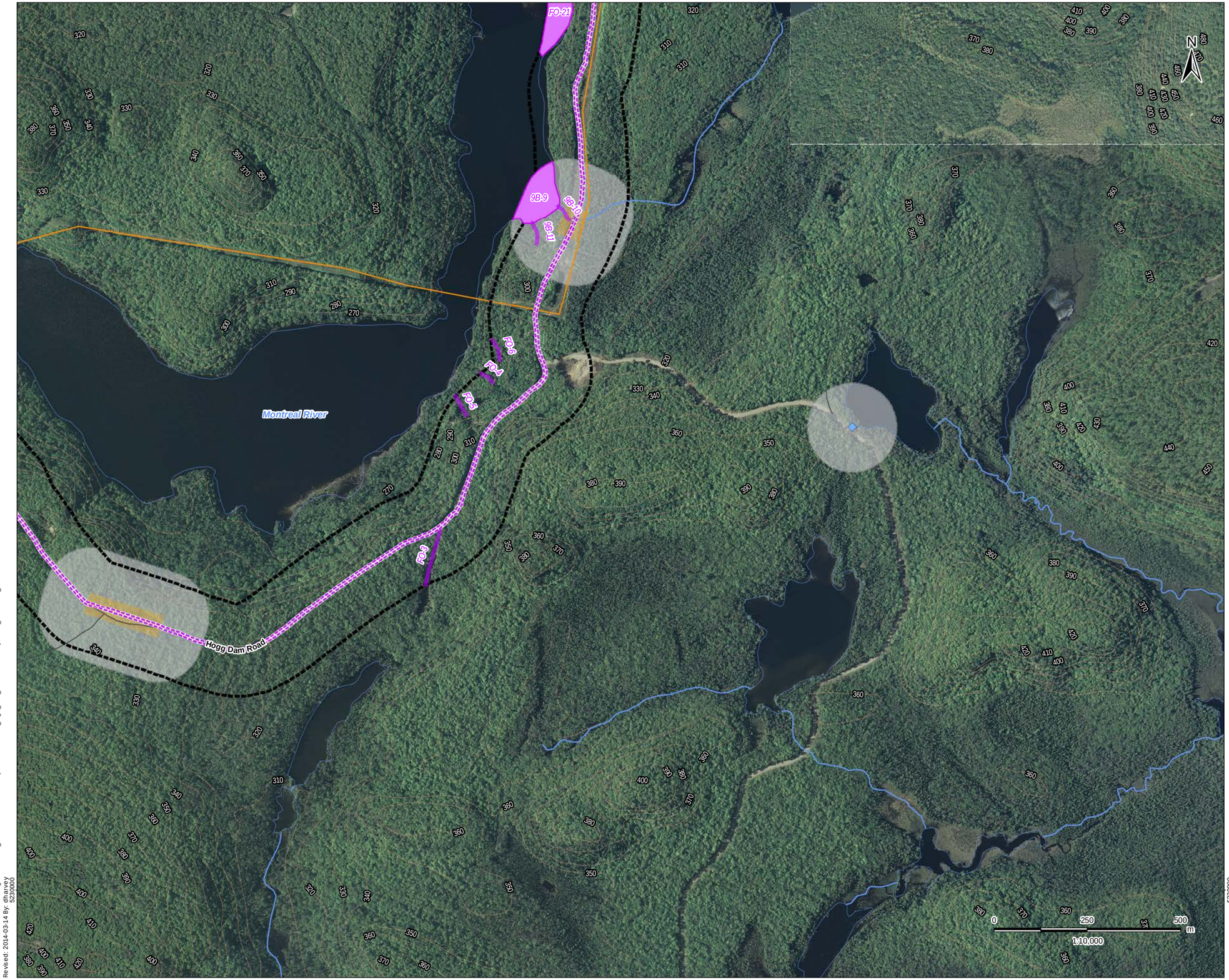

Stantec

Legend

- 120m Zone of Investigation
- Previously Assessed 120m Zone of Investigation
- Fibre Optic Line Location

Previously Assessed Project Components

- Turbine Location
- Gate Location
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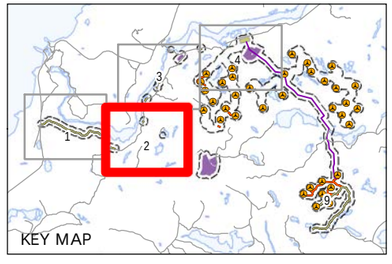
Existing Features

- Expressway / Highway
- Road
- Elevation Contour
- Existing Transmission Line
- Watercourse
- Waterbody
- Patent Land
- Fish Bearing Water Body



Notes

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Client/Project
Bow Lake Wind Farm
Nodin Kitagan Limited Partnership and Nodin Kitagan 2 Limited Partnership, through their General Partners Shongwish Nodin Kitagan GP Corp. and Shongwish Nodin Kitagan 2 GP Corp.

Figure No.
3.2

Title
Fish Bearing Water Bodies in the Zone of Investigation

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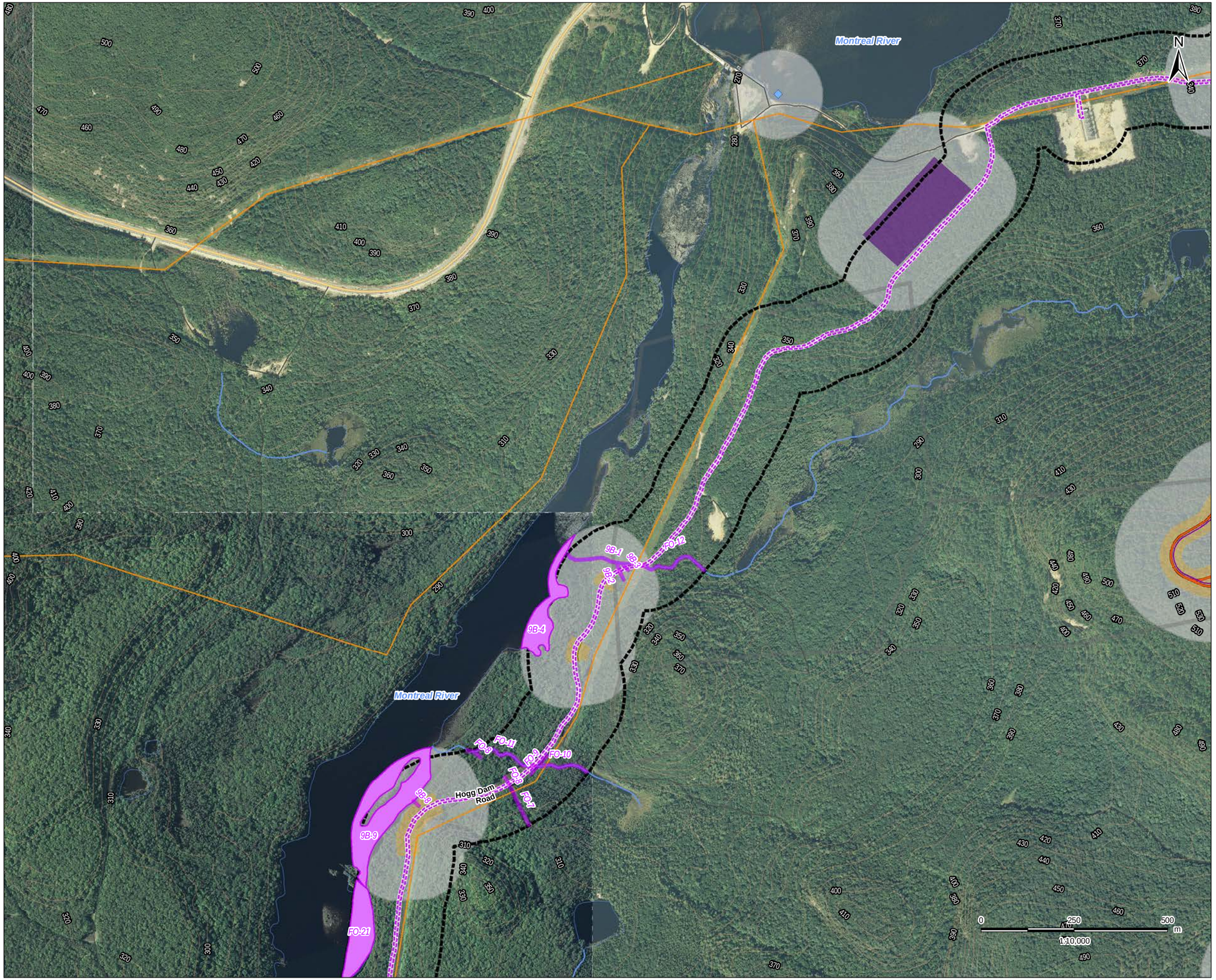

Stantec

Legend

- 120m Zone of Investigation
- Previously Assessed 120m Zone of Investigation
- Fibre Optic Line Location

Previously Assessed Project Components

- Turbine Location
- Gate Location
- Meteorological Tower
- Proposed Water Extraction Location
- Access Road (New)
- Access Road (Upgrade)
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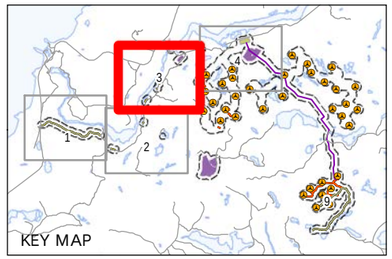
Existing Features

- Expressway / Highway
- Road
- Elevation Contour
- Existing Transmission Line
- Watercourse
- Waterbody
- Patent Land
- Fish Bearing Water Body



Notes

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160960771

Client/Project
Bow Lake Wind Farm
Nodin Kitagan Limited Partnership and Nodin Kitagan 2 Limited Partnership, through their General Partners Shongwish Nodin Kitagan GP Corp. and Shongwish Nodin Kitagan 2 GP Corp.

Figure No.
3.3

Title
Fish Bearing Water Bodies in the Zone of Investigation

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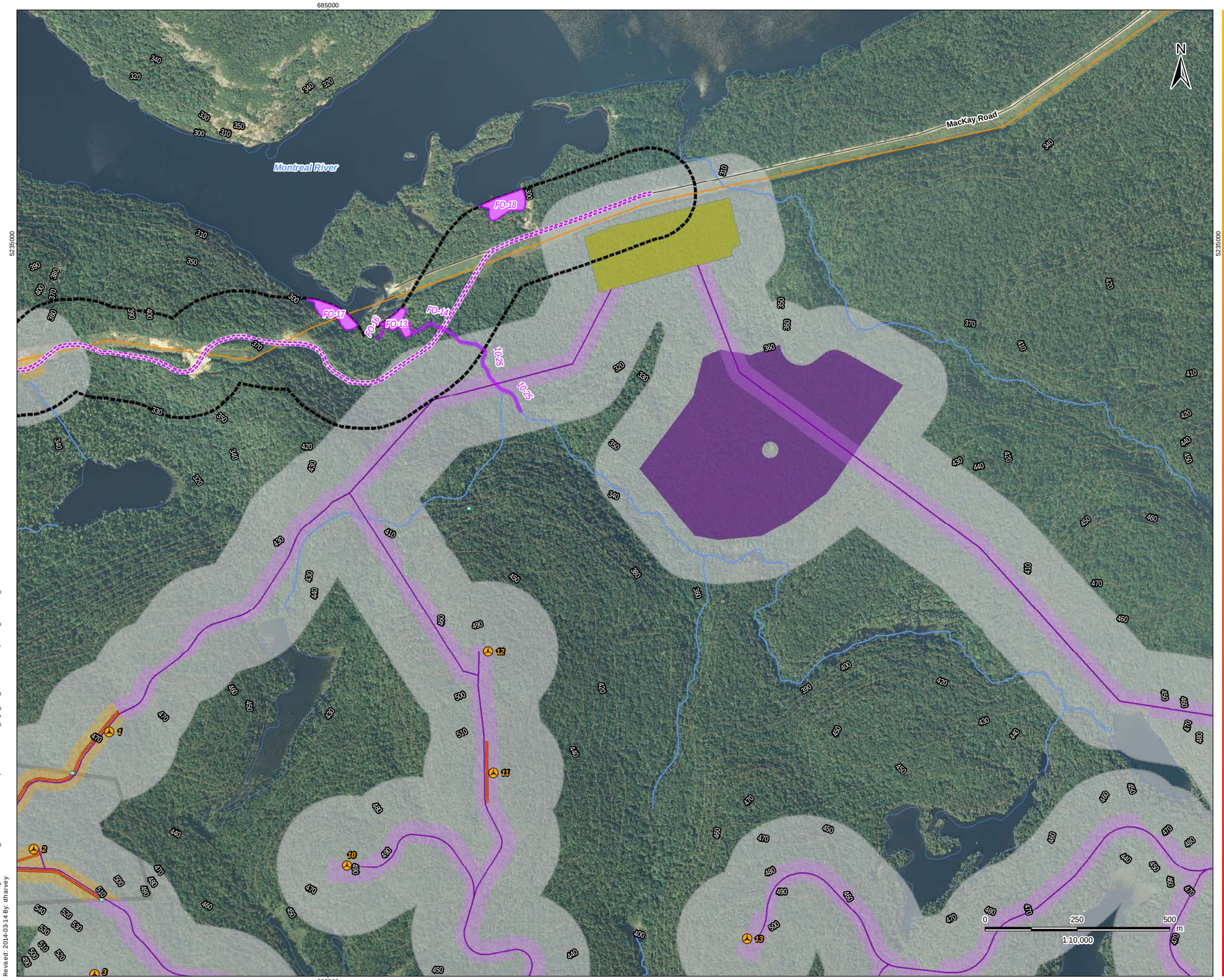


Stantec

Legend

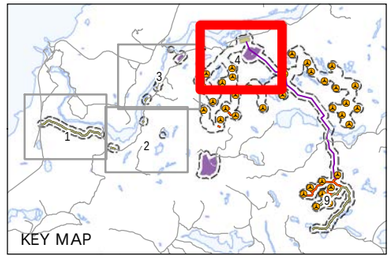
- 120m Zone of Investigation
- Previously Assessed 120m Zone of Investigation
- Fibre Optic Line Location

Previously Assessed Project Components

- Turbine Location
- Gate Location
- Meteorological Tower
- Proposed Water Extraction Location
- Access Road (New)
- Access Road (Upgrade)
- Overhead/Un... Collector Line
- Access Road Corridor
- Collector Line Corridor
- Construction Compound
- Construction Compound & Welfare Building
- Construction Compound & Transformer Station/Operations & Maintenance Building

Existing Features

- Expressway / Highway
- Road
- Elevation Contour
- Existing Transmission Line
- Watercourse
- Waterbody
- Patent Land
- Fish Bearing Water Body



Notes

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3. Orthographic imagery provided by © Bing, 2013.

March 2014
160960771

Client/Project
Bow Lake Wind Farm
Nodin Kitagan Limited Partnership and Nodin Kitagan 2 Limited Partnership, through their General Partners Shongwish Nodin Kitagan GP Corp. and Shongwish Nodin Kitagan 2 GP Corp.

Figure No.
3.4

Title
Fish Bearing Water Bodies in the Zone of Investigation

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Revised: 2014-03-14 By: dharvey

Appendix B:

Field Notes

0-3 u/s = 0678543 5231574
0-3 d/s = 0678514 5231734

Too shallow to fish + WQ

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 0-3
Project Name Bow Lake Wind Farm
Watercourse Name unknown trib to Mont. Rv.
Project # 1609 60734
Photos 611 - 613
Field Staff NB, MF
Date July 12 /12
Time 13:30
Weather conditions in previous 24 hrs No precip. Hot, 28°c
GPS Coordinates (Zone) 16T E — N — Datum NAD83
Descriptive Location ~1km east of Hwy 17 on Dump Rd. Crosses over rd. No culvert.

Too Shallow

Water Quality
Dissolved Oxygen (mg/L) _____ pH _____ Conductivity (µS/cm) _____
Water Temperature (°C) _____ Air Temperature (°C) _____
Time *in situ* measurements taken _____

Watercourse Dimensions & Morphology
Mean Watercourse Width 0.4 (m) Maximum Pool Depth 5.0 (cm)
Mean Bankfull Width 1.2 (m) Mean Water Depth 3.0 (cm)
_____ % Riffle 100 % Pool _____ % Run _____ % Flat
Evidence of eroding banks, Comments on bank stability minor scour on banks u/s + d/s but well veg'd.

Substrate (% cover)
_____ Bedrock 20 Cobble 25 Sand 10 Silt _____ Muck
10 Boulder 15 Gravel _____ Clay _____ Marl 20 Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other _____

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
100% Sugar maple, yellow birch, fern sp.
Adjacent Land Use
forest, ATV trail (Dump Rd)

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
~~Possible spawn + nursery closer to Montreal Rv (d/s)~~
Migratory Obstructions (seasonal, permanent)
Steep gradient, no culvert @ Dump Rd, dry
Note any fish observations none.

Waterbody Notes
Natural Watercourse ✓ Trapezoidal Channel _____ Grassed Swale _____ Buried Tile _____
Surficial Drainage (i.e. furrows) _____ Dugout Pond _____ Dominated by Aquatic Veg _____ Dry _____

Other Habitat Notes, Incidental Wildlife Observations, etc.
Intermittent Indirect
0-3 u/s = 0678543 5231574
0-3 d/s = 0678514, 5231734

Field Notes Authored by MF Field Notes QA/QCed by MEllah

W:\resource\Internal Info and Teams\Aquatic Resources\Field Sheets\Stantec\Form 02 Wind Farm Waterbody Rapid Assessment Form.doc

0-2 u/s = 0678741 5231425
0-2 d/s - 0678788 5231610

Too shallow to fish + WQ

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 0-2
Project Name Bow Lake Wind Farm
Watercourse Name unknown
Project # 1609 60734
Photos 608-610
Field Staff NB MF
Date July 12/12
Time 13:15
Weather conditions in previous 24 hrs No precip. Hot, 28°C
GPS Coordinates (Zone) 16T E — N — Datum NAD83
Descriptive Location ~1.2 km east of Hwy 17 on Dump Rd. Crosses under Dump Rd.

Too shallow standing water

Water Quality
Dissolved Oxygen (mg/L) _____ pH _____ Conductivity (µS/cm) _____
Water Temperature (°C) _____ Air Temperature (°C) _____
Time *in situ* measurements taken _____

Watercourse Dimensions & Morphology
Mean Watercourse Width 0.4 (m) Maximum Pool Depth 2 (cm) STAND WATER
Mean Bankfull Width 0.6 (m) Mean Water Depth — (cm)
_____% Riffle _____% Pool _____% Run _____% Flat
Evidence of eroding banks, Comments on bank stability minor scour u/s + d/s. but well vegt'd

Substrate (% cover)
Bedrock 10 Cobble 30 Sand 20 Silt _____ Muck _____
10 Boulder 20 Gravel _____ Clay _____ Marl 10 Detritus _____

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other _____

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
80% sugar maple, fern sp, yellow birch
Adjacent Land Use
forest, ATV trail (Dump Rd)

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
~~possible spawning closer to Montreal Ru. mouth.~~
Migratory Obstructions (seasonal, permanent)
Steep gradient, perched culvert, dry
Note any fish observations none.

Waterbody Notes ✓
Natural Watercourse _____ Trapezoidal Channel _____ Grassed Swale _____ Buried Tile _____
Surficial Drainage (i.e. furrows) _____ Dugout Pond _____ Dominated by Aquatic Veg _____ Dry _____

Other Habitat Notes, Incidental Wildlife Observations, etc. 0-2 u/s = 0678741 5231425
Intermittent, Indirect. 0-2 d/s = 0678788 5231610
Frog sp. in standing watr pools u/s + d/s

Field Notes Authored by MF Field Notes QA/QCed by MEllah

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WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # FO-2
Project Name Bow Lake Wind Farm
Watercourse Name Unnamed
Project # 160960771
Photos 1057 - 1071
Field Staff MEllah, N Leava
Date July 14/2013
Time 09:30
Weather conditions in previous 24 hrs clear ~20°C
d/s GPS Coordinates (Zone) 16T E 680416 N 5231200 Datum NAD83
Descriptive Location Along Hogg Dam Rd
also location of seep U/S GPS 680362 E 5231076 N 16T
U/S of this location no clear channel dominant terrestrial veg - likely spring freshet drainage

Water Quality NOT ENOUGH WATER
Dissolved Oxygen (mg/L) _____ pH _____ Conductivity (µS/cm) _____
Water Temperature (°C) _____ Air Temperature (°C) 20
Time *in situ* measurements taken _____

Watercourse Dimensions & Morphology
Mean Watercourse Width 1.0 (m) Maximum Pool Depth 15 (cm)
Mean Bankfull Width 2.0 (m) Mean Water Depth 10 (cm)
90 % Riffle 10 % Pool 0 % Run 0 % Flat
Evidence of eroding banks, Comments on bank stability stable banks - supported by herbaceous veg, trees, shrubs + boulder/bedrock

Substrate (% cover)
5 Bedrock 40 Cobble 25 Sand _____ Silt _____ Muck
20 Boulder 5 Gravel _____ Clay _____ Marl 5 Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other _____

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
80% - mixed forest; sugar maple, yellow birch, balsam fir - mature
Adjacent Land Use
road, natural forest

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
indirect habitat - cold water source from seep - freshet source/nutrient source in spring
Migratory Obstructions (seasonal, permanent)
high gradient - low water levels (seasonal)
Note any fish observations none

Waterbody Notes
Natural Watercourse ✓ Trapezoidal Channel _____ Grassed Swale _____ Buried Tile _____
Surficial Drainage (i.e. furrows) _____ Dugout Pond _____ Dominated by Aquatic Veg _____ Dry _____

Other Habitat Notes, Incidental Wildlife Observations, etc. winter wren/swainsons thrush, black-throated blue warbler, red eyed vireo
SW of Hogg Dam Rd FO-2 is intermittent - NE of Hogg Dam Rd FO-2 permanent

Field Notes Authored by MEllah Field Notes QA/QCed by _____

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WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # Fo-3
Watercourse Name unnamed
Photos 1076 - 1088
Date July 14/2013
Weather conditions in previous 24 hrs clear ~20°C
u/s GPS Coordinates (Zone) 16T E 681526 N 5230825 Datum NAD83
Descriptive Location SW of Hoag Dam Rd
GPS Coordinates D/S → 681571E, 5230938N 16T

Project Name Bow Lake Wind Farm
Project # 160960771
Field Staff MEllah, N Leava
Time 11:00

Water Quality
Dissolved Oxygen (mg/L) 5.55 pH 7.33 Conductivity (µS/cm) 39
Water Temperature (°C) 19.11 Air Temperature (°C) ~20°C
Time *in situ* measurements taken 11:00

Watercourse Dimensions & Morphology
Mean Watercourse Width 8.0 (m) Maximum Pool Depth 0.30 (cm)
Mean Bankfull Width 10 (m) Mean Water Depth 0.25 (cm)
0 % Riffle 0 % Pool 0 % Run 100 % Flat
Evidence of eroding banks, Comments on bank stability stable banks - sedges, grasses, organic debris, surrounding trees & shrubs

Substrate (% cover)
Bedrock ___ Cobble ___ Sand ___ Silt 10 Muck
Boulder ___ Gravel ___ Clay ___ Marl 90 Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other ___

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
10% - mixed forest - birch, maple spruce - mature
Adjacent Land Use
natural forest

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
appears to be good habitat for small bodied fish - may be too shallow for overwintering fish
Migratory Obstructions (seasonal, permanent) → disconnected - not online
dam - old beaver dam or skidder trail (historic)
Note any fish observations none observed

Waterbody Notes
Natural Watercourse ✓ Trapezoidal Channel ___ Grassed Swale ___ Buried Tile ___
Surficial Drainage (i.e. furrows) ___ Dugout Pond ___ Dominated by Aquatic Veg ___ Dry ___

Other Habitat Notes, Incidental Wildlife Observations, etc. Green frogs
Alder Flycatcher, Northern Parula
waterbody source water from u/s lake - D/s dam + upland disconnects waterbody & restricts drainage

Field Notes Authored by MEllah Field Notes QA/QCed by ___

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WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # FO-5
Watercourse Name unnamed
Photos 1109 - 1113
Date July 14/2013
Weather conditions in previous 24 hrs clear ~20°C
d/s GPS Coordinates (Zone) 16T E 681628 N 5231349 Datum NAD83
Descriptive Location FO-5 u/s (seep) GPS Coordinates 16T 681671 E 5231301 N

Project Name Bow Lake Wind Farm
Project # 160960771
Field Staff MEllah, N Leaver
Time 12:20

Water Quality
Dissolved Oxygen (mg/L) 10.64 pH 7.37 Conductivity (µS/cm) 47
Water Temperature (°C) 13.86 Air Temperature (°C) ~25°C
Time *in situ* measurements taken 12:25

Watercourse Dimensions & Morphology
Mean Watercourse Width 1.0 (m) Maximum Pool Depth 6.0 (cm)
Mean Bankfull Width 1.2 (m) Mean Water Depth 2.0 (cm)
90 % Riffle 5 % Pool 5 % Run 0 % Flat
Evidence of eroding banks, Comments on bank stability stable banks - stabilized by herbaceous plants, trees & shrubs, mosses & leaf litter & substrate

Substrate (% cover)
Bedrock 5 Cobble 90 Sand Silt Muck
Boulder 15 Gravel Clay Marl 10 Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
90% - mixed forest dominant sugar maple, balsam fir, birch, mid succession
Adjacent Land Use
Montreal River (d/s) - forest

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
indirect habitat - cold water source for Montreal River
Migratory Obstructions (seasonal, permanent)
high gradient
Note any fish observations none

Waterbody Notes
Natural Watercourse ✓ Trapezoidal Channel Grassed Swale Buried Tile
Surficial Drainage (i.e. furrows) Dugout Pond Dominated by Aquatic Veg Dry

Other Habitat Notes, Incidental Wildlife Observations, etc. FO-5 origins with a seep

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WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # FO-4
Project Name Bow Lake Wind Farm
Watercourse Name unnamed
Project # 160960771
Photos 1093-1106
Field Staff MEllah, N Leava
Date July 14 2013
Time 11:45
Weather conditions in previous 24 hrs clear ~20 °C
u/s GPS Coordinates (Zone) 16T E 681866 N 5231337 Datum NAD83
Descriptive Location East of Hogg Dam Rd.
d/s GPS coordinate 681627 E, 5231354 N 16T

Water Quality
Dissolved Oxygen (mg/L) 9.19 pH 6.91 Conductivity (µS/cm) 36
Water Temperature (°C) 10.64 Air Temperature (°C) ~20
Time *in situ* measurements taken 12:05

Watercourse Dimensions & Morphology
Mean Watercourse Width 0.40 (m) Maximum Pool Depth 5.0 (cm)
Mean Bankfull Width 0.60 (m) Mean Water Depth 3.0 (cm)
70 % Riffle 10 % Pool 20 % Run ____ % Flat
Evidence of eroding banks, Comments on bank stability stable banks - stabilized with trees, shrubs, mosses, leaf litter, boulder substrates

Substrate (% cover)
____ Bedrock 25 Cobble 30 Sand ____ Silt ____ Muck
10 Boulder 30 Gravel ____ Clay ____ Marl 5 Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other ____

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
90% - mid successional mixed forest - sugar maple, white cedar, yellow birch
Adjacent Land Use
road, forest

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
indirect fish habitat - cold water source for Montreal River
Migratory Obstructions (seasonal, permanent)
high gradient
Note any fish observations none observed

Waterbody Notes
Natural Watercourse ✓ Trapezoidal Channel ____ Grassed Swale ____ Buried Tile ____
Surficial Drainage (i.e. furrows) ____ Dugout Pond ____ Dominated by Aquatic Veg ____ Dry ____

Other Habitat Notes, Incidental Wildlife Observations, etc. FO-4 starts on east side of Hogg Dam Rd, then channel runs south adjacent to road, then crosses road in culvert, flowing west where it drains into the Montreal River

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WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # FO-6
Watercourse Name unnamed
Photos 1114 - 1118
Date July 14/2013

Project Name Bow Lake
Project # 160960771
Field Staff MEllah, N Leava
Time 12:55

Weather conditions in previous 24 hrs clear ~ 20°C
d/s GPS Coordinates (Zone) 16T E 681665 N 5231394 Datum NAD83
Descriptive Location u/s GPS 16T 681796 E, 5231367 N

Water Quality
Dissolved Oxygen (mg/L) 11.67 pH 7.90 Conductivity (µS/cm) 85
Water Temperature (°C) 12.23 Air Temperature (°C) 25
Time *in situ* measurements taken 12:55

Watercourse Dimensions & Morphology
Mean Watercourse Width 0.30 (m) Maximum Pool Depth 4.0 (cm)
Mean Bankfull Width 0.50 (m) Mean Water Depth 3.0 (cm)
90 % Riffle 5 % Pool 5 % Run 0 % Flat
Evidence of eroding banks, Comments on bank stability stable banks - stabilized by ground cover, trees & shrubs

Substrate (% cover)
Bedrock 10 Cobble 75 Sand ___ Silt ___ Muck ___
Boulder 10 Gravel ___ Clay ___ Marl 5 Detritus ___

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other ___

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
90% - mixed forest - sugar maple, birch, balsam fir
Adjacent Land Use
Montreal River, forest

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
indirect fish habitat providing cold water to Montreal River
Migratory Obstructions (seasonal, permanent)
high gradient
Note any fish observations none

Waterbody Notes
Natural Watercourse ✓ Trapezoidal Channel ___ Grassed Swale ___ Buried Tile ___
Surficial Drainage (i.e. furrows) ___ Dugout Pond ___ Dominated by Aquatic Veg ___ Dry ___

Other Habitat Notes, Incidental Wildlife Observations, etc. Seep for FO-6 @ 16T 681743 E 5231381 N
FO-6 @ road GPS 16T 681809 E, 5231367 N
FO-6 & FO-4 share part source water
this section of channel is more of a washout from rainfall events/melts & runoff from road

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WIND FARM WATERBODY RAPID ASSESSMENT FORM

Traps set

Stantec

Station # 9B-11
Project Name Bow Lake Wind Farm
Watercourse Name unknown
Project # 1609 60734
Photos 599-601
Field Staff NBMF
Date July 12/12
Time 11:35
Weather conditions in previous 24 hrs No precip. 27°C hot.
GPS Coordinates (Zone) 16T E 0681825 N 5231566 Datum NAD83
Descriptive Location ~200 m north of Rebecca on Hogg Dam Rd.
Crosses under rd.

Water Quality
Dissolved Oxygen (mg/L) 7.39 pH 7.22 Conductivity (µS/cm) 49
Water Temperature (°C) 11.97 Air Temperature (°C) 28°C
Time *in situ* measurements taken 11:40

Watercourse Dimensions & Morphology
Mean Watercourse Width 0.65 (m) Maximum Pool Depth 8 (cm)
Mean Bankfull Width 2.0 (m) Mean Water Depth 5 (cm)
60 % Riffle 20 % Pool 20 % Run ____ % Flat
Evidence of eroding banks, Comments on bank stability none observed. Rip Rap on d/s side near culvert. well vegt'd banks.

Substrate (% cover)
Bedrock 30 Cobble 30 Sand ____ Silt 10 Muck
Boulder 20 Gravel ____ Clay ____ Marl 10 Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other ____

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
40%, sugar maple (immature), under hydro lines ∴ trimmed + sprayed
Adjacent Land Use
hydro corridor, Hogg Rd, forest

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
Possible spawn, forage, nursery.
Migratory Obstructions (seasonal, permanent)
Steep gradient in d/s section
Note any fish observations none

Waterbody Notes
Natural Watercourse ✓ Trapezoidal Channel ____ Grassed Swale ____ Buried Tile ____
Surficial Drainage (i.e. furrows) ____ Dugout Pond ____ Dominated by Aquatic Veg ____ Dry ____

Other Habitat Notes, Incidental Wildlife Observations, etc.
Permanent

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WIND FARM WATERBODY RAPID ASSESSMENT FORM

Traps set

Station # 9B-10
Watercourse Name unknown
Photos 597-598
Date July 12/12

Project Name Bow Lake Wind Farm
Project # 1609 60734
Field Staff NB, MF
Time 11:15

Weather conditions in previous 24 hrs No precipitation, 27°c
GPS Coordinates (Zone) 16T E 0689129 N 5231791 Datum NAD83
Descriptive Location On Hogg Dam Rd ~325m north of Rebecca Rd.

Water Quality
Dissolved Oxygen (mg/L) 7.47 pH 6.95 Conductivity (µS/cm) 60
Water Temperature (°C) 10.00 Air Temperature (°C) 28°c
Time *in situ* measurements taken 11:20

Watercourse Dimensions & Morphology
Mean Watercourse Width 1.2 (m) Maximum Pool Depth ~~05~~ 15.0 (cm)
Mean Bankfull Width 2.5 (m) Mean Water Depth 8 (cm)
60 % Riffle 10 % Pool 30 % Run ____ % Flat
Evidence of eroding banks, Comments on bank stability minor undercut banks

Substrate (% cover)
Bedrock 30 Cobble 40 Sand ____ Silt ____ Muck ____
Boulder 20 Gravel ____ Clay ____ Marl 10 Detritus ____

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other ____

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
70% white birch, sugar maple, eastern white cedar. D/S area open: not much shade
Adjacent Land Use
Hogg Dam Rd, Hydro Corridor, forest.

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
spawn nursery, forage
Migratory Obstructions (seasonal, permanent)
Steep gradient on d/s side
Note any fish observations none

Waterbody Notes
Natural Watercourse ✓ Trapezoidal Channel ____ Grassed Swale ____ Buried Tile ____
Surficial Drainage (i.e. furrows) ____ Dugout Pond ____ Dominated by Aquatic Veg ____ Dry ____

Other Habitat Notes, Incidental Wildlife Observations, etc. ____

Field Notes Authored by MF Field Notes QA/QCed by M Ellah

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WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 9B-9
Watercourse Name Montreal River
Photos 593-595
Date July 11/12
Weather conditions in previous 24 hrs No precip. Hot 28°c
GPS Coordinates (Zone) 16T E 0681969 N 5232664 Datum NAD83
Descriptive Location In bay of Montreal Ru ~1.0 km north of Rebecca Rd

Project Name Bow Lake Wind Farm
Project # 160960734
Field Staff NB, MF
Time 17:10

Water Quality
Dissolved Oxygen (mg/L) 7.79 pH 7.00 Conductivity (µS/cm) 51
Water Temperature (°C) 26.22 Air Temperature (°C) 28°c
Time *in situ* measurements taken 17:15

Watercourse Dimensions & Morphology
Bay
Mean Watercourse Width 235 (m) Maximum Pool Depth ✓ (cm)
Mean Bankfull Width 235 (m) Mean Water Depth ✓ (cm)
___ % Riffle 100 % Pool ___ % Run ___ % Flat
Evidence of eroding banks, Comments on bank stability none

Substrate (% cover)
Bedrock 30 Cobble 20 Sand ___ Silt ___ Muck ___
20 Boulder 30 Gravel ___ Clay ___ Marl ___ Detritus ___

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other ___

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
5% water receeded due to dam activities.
Adjacent Land Use
Hogg Rd

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
Spawn, nursery, forage
Migratory Obstructions (seasonal, permanent)
none
Note any fish observations School of cyprinidae

Waterbody Notes
Natural Watercourse ✓ Trapezoidal Channel ___ Grassed Swale ___ Buried Tile ___
Surficial Drainage (i.e. furrows) ___ Dugout Pond ___ Dominated by Aquatic Veg ___ Dry ___

Other Habitat Notes, Incidental Wildlife Observations, etc. ruffed grouse w 2 babies

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WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # FO-21
Project Name Bow Lake Wind Farm
Watercourse Name Montreal River
Project # 160960771
Photos 1178 - 1180
Field Staff M Ellah, N Leawa
Date July 15/2013
Time 15:00
Weather conditions in previous 24 hrs clear, ~28°C
GPS Coordinates (Zone) 16T E 681914 N 5232425 Datum NAD83
Descriptive Location shoreline, montreal River

Water Quality
Dissolved Oxygen (mg/L) _____ pH _____ Conductivity (µS/cm) _____
Water Temperature (°C) _____ Air Temperature (°C) _____
Time *in situ* measurements taken _____

Watercourse Dimensions & Morphology
Mean Watercourse Width _____ (m) Maximum Pool Depth _____ (cm)
Mean Bankfull Width _____ (m) Mean Water Depth _____ (cm)
_____ % Riffle _____ % Pool _____ % Run _____ % Flat
Evidence of eroding banks, Comments on bank stability _____

Substrate (% cover)
_____ Bedrock _____ Cobble _____ Sand _____ Silt _____ Muck
_____ Boulder _____ Gravel _____ Clay _____ Marl _____ Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other _____

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
_____
Adjacent Land Use
_____

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
_____
Migratory Obstructions (seasonal, permanent)
_____
Note any fish observations _____

Waterbody Notes
Natural Watercourse ____ Trapezoidal Channel ____ Grassed Swale ____ Buried Tile ____ Seep ____
Surficial Drainage (i.e. furrows) ____ Dugout Pond ____ Dominated by Aquatic Veg ____ Dry ____

Other Habitat Notes, Incidental Wildlife Observations, etc. _____
Full Assessment can be found at 9B-9 from Aquatic Assessments 2012

Field Notes Authored by M Ellah Field Notes QA/QCed by _____

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FULL ASSESSMENT SEE 9B-9

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

MT Set

Station # 9B-8
Watercourse Name unknown
Photos 590-592
Date July 11 /12
Project Name Bow Lake Wind Farm
Project # 1609 60734
Field Staff NB, MF
Time 16:55
Weather conditions in previous 24 hrs no precip. Hot, 28°c
GPS Coordinates (Zone) 16T E 0682053 N 5232704 Datum NAD83
Descriptive Location ~1.5 km north of Rebecca Rd on Hogg Rd.

Water Quality
Dissolved Oxygen (mg/L) 7.40 pH 7.0 Conductivity (µS/cm) 31
Water Temperature (°C) 15.14 Air Temperature (°C) 27°c
Time *in situ* measurements taken 17:00

Watercourse Dimensions & Morphology
Mean Watercourse Width 0.5 (m) Maximum Pool Depth 7 (cm)
Mean Bankfull Width 1.0 (m) u/s Mean Water Depth 5 (cm)
40 d/s % Riffle 100 % Pool 60 d/s % Run % Flat
Evidence of eroding banks, Comments on bank stability none

Substrate (% cover)
Bedrock 50 d/s Cobble 10 u/s Sand 40 u/s Silt 20 u/s Muck
Boulder 50 d/s Gravel Clay Marl 30 u/s Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
80%, black spruce, poplar sp, white birch
Adjacent Land Use
Hogg Rd

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
spawn, forage, nursery.
Migratory Obstructions (seasonal, permanent)
none
Note any fish observations none

Waterbody Notes ✓
Natural Watercourse Trapezoidal Channel Grassed Swale Buried Tile
Surficial Drainage (i.e. furrows) Dugout Pond Dominated by Aquatic Veg Dry

Other Habitat Notes, Incidental Wildlife Observations, etc. Direct, permanent
u/s area is ponded ~ 10m wide + + 1.0m deep.

Field Notes Authored by MF Field Notes QA/QCed by MB

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WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # FO-8
Watercourse Name unnamed
Photos 1124 - 1128
Date July 14/2013

Project Name Bow Lake Wind Farm
Project # 160960771
Field Staff MEllah, N Leava
Time 14:50

Weather conditions in previous 24 hrs clear ~20°C

FO-8 d/s (WPT) GPS Coordinates (Zone) 16T E 682142 N 5232856 Datum NAD83

Descriptive Location FO-8 US (WPT) GPS Coordinate 16T 682260E 5232787N

Water Quality

Dissolved Oxygen (mg/L) 8.02 pH 6.20 Conductivity (µS/cm) 10
Water Temperature (°C) 16.75 Air Temperature (°C) 27
Time *in situ* measurements taken 14:50

Watercourse Dimensions & Morphology

Mean Watercourse Width 6.40 (m) Maximum Pool Depth 4.0 (cm)
Mean Bankfull Width 0.50 (m) Mean Water Depth 3.0 (cm)
90 % Riffle 5 % Pool 5 % Run 0 % Flat
Evidence of eroding banks, Comments on bank stability stable - stabilized with ground cover, substrate, trees & shrubs & herbaceous veg.

Substrate (% cover)

Bedrock 15 Cobble 50 Sand Silt 5 Muck
5 Boulder 15 Gravel Clay Marl 10 Detritus

In-water Cover

Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
85% - mid successional mixed forest of birch, balsam fir, sugar maple
Adjacent Land Use
Hogg Dam Rd, forest

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
indirect fish habitat - drains into Montreal River
Migratory Obstructions (seasonal, permanent)
high gradient, low water levels
Note any fish observations none

Waterbody Notes

Natural Watercourse ✓ Trapezoidal Channel Grassed Swale Buried Tile
Surficial Drainage (i.e. furrows) Dugout Pond Dominated by Aquatic Veg Dry

Other Habitat Notes, Incidental Wildlife Observations, etc.

Field Notes Authored by MEllah Field Notes QA/QCed by

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WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # FO - 7
Watercourse Name unnamed
Photos 1119 - 1123
Date July 14/2013
Weather conditions in previous 24 hrs clear ~20°C
u/s GPS Coordinates (Zone) 16T E 682313 N 5232787 Datum NAD83
Descriptive Location d/s - impounded at Hogg Dam Rd. → perched culvert drains pond in high water

Project Name Bow Lake Wind Farm
Project # 160960771
Field Staff MEllah, N Leava
Time 14:00

Water Quality
Dissolved Oxygen (mg/L) 7.73 pH 6.78 Conductivity (µS/cm) 18
Water Temperature (°C) 24.15 Air Temperature (°C) 27
Time *in situ* measurements taken 14:10

Watercourse Dimensions & Morphology
Mean Watercourse Width 10 (m) Maximum Pool Depth 40 (cm)
Mean Bankfull Width 12 (m) Mean Water Depth 30 (cm)
← 15m/10m
0 % Riffle 0 % Pool 0 % Run 100 % Flat
Evidence of eroding banks, Comments on bank stability stable banks with herbaceous vegetation, shrubs & bedrock, ground cover with leaf litter.

Substrate (% cover)
Bedrock Cobble Sand Silt 40 Muck
Boulder Gravel Clay Marl 60 Detritus
D ⊗ west side of Hogg Dam Rd substrate iron stained

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
30% - mixed forest - mid successional maples, spruce, birch
Adjacent Land Use
Hogg Dam Rd, forest

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
- spawning & nursery habitat for small bodied fish - provides in water cover, aquatic vegetation
Migratory Obstructions (seasonal, permanent)
impoundment with road
Note any fish observations fish observed - cyprinids

Waterbody Notes
Natural Watercourse ✓ Trapezoidal Channel Grassed Swale Buried Tile
Surficial Drainage (i.e. furrows) Dugout Pond Dominated by Aquatic Veg Dry

Other Habitat Notes, Incidental Wildlife Observations, etc. FO7 u/s WPT @ seep location which is source water for impounded pond
- perched culvert drains pond in highwater - impoundment permeates through
- Green frogs, spring peepers - road + waterbody begins on west side of Hogg Dam road (FO-8)

Field Notes Authored by MEllah Field Notes QA/QCed by

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WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # FO-9 (~~impoundment at road~~) FO-9 US road
Watercourse Name Unnamed
Photos 1129 + 1130
Date July 14 2013

Project Name Bow Lake Wind Farm
Project # 160960771
Field Staff MEllah, N Leava
Time 15:45

Weather conditions in previous 24 hrs clear ~20°C
GPS Coordinates (Zone) 16T E 682344 N 5232815 Datum NAD83
Descriptive Location FO-9 US road (WPT) 16T 682420E, 5232910N — FO-9 DS (WPT)
~~FO-9 US (WPT) 16T 682464E, 5232811N~~ — upstream impoundment reach

Water Quality
Dissolved Oxygen (mg/L) 10.72 pH 6.80 Conductivity (µS/cm) 31
Water Temperature (°C) 28.75 Air Temperature (°C) ~29°C
Time *in situ* measurements taken 15:45
~~FO-9 US~~ FO-10

Watercourse Dimensions & Morphology
Mean Watercourse Width 5.0 (m) Maximum Pool Depth 30 (cm)
Mean Bankfull Width 8.0 (m) Mean Water Depth ____ (cm)
0 % Riffle 30 % Pool 0 % Run 70 % Flat
Evidence of eroding banks, Comments on bank stability stable banks - stabilized with ground cover, trees/shrubs & herbaceous cover

Substrate (% cover)
____ Bedrock 60 Cobble 10 Sand ____ Silt ____ Muck
5 Boulder 5 Gravel ____ Clay ____ Marl 20 Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other ____

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
5% cover - dogwood along bank & inwater bullrush
Adjacent Land Use
Hogg Dam Road, forest

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
Migratory Obstructions (seasonal, permanent)
road impoundment
Note any fish observations fish observed - small bodied cyprinids - dace

Waterbody Notes
Natural Watercourse ✓ Trapezoidal Channel ____ Grassed Swale ____ Buried Tile ____
Surficial Drainage (i.e. furrows) ____ Dugout Pond ____ Dominated by Aquatic Veg ____ Dry ____
impounded by road
Other Habitat Notes, Incidental Wildlife Observations, etc. FO-9 impounded by road
FO-10 source water for FO-9 (impoundment at road)
FO-9 drains west under Hogg Dam Rd at waypoint FO-9ds

Field Notes Authored by MEllah Field Notes QA/QCed by ____

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WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # FO-10
Watercourse Name unnamed
Photos 1131 - 1137
Date July 14 2013

Project Name Bow Lake Wind Farm
Project # 160960771
Field Staff MEllah, N Leava
Time 16:15

Weather conditions in previous 24 hrs clear 20°C
GPS Coordinates (Zone) 16T E 682464 N 5232811 Datum NAD83
Descriptive Location FO-10us (WPT)
FO-10ds (WPT) 16T 682408E, 5232883N

Water Quality
Dissolved Oxygen (mg/L) 8.61 pH 6.94 Conductivity (µS/cm) 30
Water Temperature (°C) 23.76 Air Temperature (°C) 29
Time *in situ* measurements taken 16:25

Watercourse Dimensions & Morphology
Mean Watercourse Width 0.5 (m) Maximum Pool Depth 12.0 (cm)
Mean Bankfull Width 0.70 (m) Mean Water Depth 7.0 (cm)
30 % Riffle 40 % Pool 30 % Run ____ % Flat
Evidence of eroding banks, Comments on bank stability stable banks - stabilized by ground cover, trees, shrubs + herbaceous veg.

Substrate (% cover)
____ Bedrock 10 Cobble 90 Sand ____ Silt ____ Muck
5 Boulder 10 Gravel ____ Clay ____ Marl 5 Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other ____

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
90% - mixed forest - maple, birch, balsam fir, cedar
Adjacent Land Use
Forest, Hogg Dam Road

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
indirect fish habitat - source water for FO-9 - fish observed in FO-9 may migrate u/s in FO-10 in high water
Migratory Obstructions (seasonal, permanent)
low water levels - obstructions due to in water debris (logs)
Note any fish observations none observed

Waterbody Notes
Natural Watercourse ✓ Trapezoidal Channel ____ Grassed Swale ____ Buried Tile ____
Surficial Drainage (i.e. furrows) ____ Dugout Pond ____ Dominated by Aquatic Veg ____ Dry ____

Other Habitat Notes, Incidental Wildlife Observations, etc.
FO-10ds (WPT) is where FO-10 discharges into FO-9

Field Notes Authored by MEllah Field Notes QA/QCed by ____

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WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # FO-11
Watercourse Name unnamed
Photos 1138-1143
Date July 15 | 2013

Project Name Bow Lake Wind Farm
Project # 160960771
Field Staff MEllah, NLeava
Time 09:10

Weather conditions in previous 24 hrs clear ~25°C
d/s GPS Coordinates (Zone) 16T E 682204 N 5232876 Datum NAD83
Descriptive Location US GPS coordinate 16T 682334 E, 5232826 N

Water Quality
Dissolved Oxygen (mg/L) 9.24 pH 6.85 Conductivity (µS/cm) 32
Water Temperature (°C) 12.27 Air Temperature (°C) 22
Time *in situ* measurements taken 09:30

Watercourse Dimensions & Morphology
Mean Watercourse Width 0.3 (m) Maximum Pool Depth 8.0 (cm)
Mean Bankfull Width 1.0 (m) Mean Water Depth 4.0 (cm)
50 % Riffle 40 % Pool 10 % Run ____ % Flat
Evidence of eroding banks, Comments on bank stability Stable - supported by substrate, ground cover, trees, shrubs + herbaceous veg.

Substrate (% cover)
____ Bedrock 20 Cobble 50 Sand ____ Silt ____ Muck
20 Boulder 10 Gravel ____ Clay ____ Marl ____ Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other ____

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
85% - mixed forest, sugar maple, yellow birch, balsam fir - mid successional
Adjacent Land Use
Hogg Dam Rd., forest, Montreal River

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
not fish habitat - short channel followed by wetland - potential for channel to form + discharge into Montreal River.
Migratory Obstructions (seasonal, permanent)
high gradient + low water levels | flows underground
Note any fish observations none

Waterbody Notes
Natural Watercourse ✓ Trapezoidal Channel ____ Grassed Swale ____ Buried Tile ____
Surficial Drainage (i.e. furrows) ____ Dugout Pond ____ Dominated by Aquatic Veg ____ Dry ____

Other Habitat Notes, Incidental Wildlife Observations, etc. d/s UTM - location where channel is lost due to infiltration. FO-11 confined to lowland with rock wall barrier. Waterbody flows underground multiple times then disappears into a wetland community

Field Notes Authored by [illegible] Field Notes QA/QCed by ____

9B-5 u/s = 0682467 5233064

Too shallow to fish

WIND FARM WATERBODY RAPID ASSESSMENT FORM

9B-5 d/s = 0682497 5233236

Stantec

Station # 9B-5
Watercourse Name unknown
Photos 581-583
Date July 11/12
Weather conditions in previous 24 hrs no precipitation 28°c
GPS Coordinates (Zone) 16T E — N — Datum NAD83
Descriptive Location ~250 south of Gate#2 when heading south on Hogg Rd. U/S starts south along rd side

Project Name Bow Lake Wind Farm
Project # 160960734
Field Staff NB, MF
Time 15:45

Water Quality
Dissolved Oxygen (mg/L) 7.63 pH 7.37 Conductivity (µS/cm) 81
Water Temperature (°C) 21.20 Air Temperature (°C) 28°c
Time *in situ* measurements taken ~~[illegible]~~ 15:50

Watercourse Dimensions & Morphology
Mean Watercourse Width 0.6 (m) Maximum Pool Depth 0.10 (cm)
Mean Bankfull Width 0.7 (m) Mean Water Depth ____ (cm)
____ % Riffle 100 % Pool ____ % Run ____ % Flat
Evidence of eroding banks, Comments on bank stability no erosion

Substrate (% cover)
____ Bedrock 25 Cobble 30 Sand ____ Silt ____ Muck
5 Boulder 30 Gravel ____ Clay ____ Marl 10 Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other ____

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
70% mountain maple, mountain ash.
Adjacent Land Use
Hogg Rd.

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
none.
Migratory Obstructions (seasonal, permanent)
underground, intermitent, perched csp.
Note any fish observations None

Waterbody Notes
Natural Watercourse ✓ Trapezoidal Channel ____ Grassed Swale ____ Buried Tile ____
Surficial Drainage (i.e. furrows) ____ Dugout Pond ____ Dominated by Aquatic Veg ____ Dry ____

Other Habitat Notes, Incidental Wildlife Observations, etc. Intermitent, Indirect.
Water disapears ~ 5 d/s (south) of Hogg Rd.

9B-5 u/s = 0682467, 5233064

Field Notes Authored by MF Field Notes QA/QCed by NB

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WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

MT set

Station # 9B-4
Watercourse Name Bay of Montreal Rv.
Photos 578-580
Date July 11 /12
Weather conditions in previous 24 hrs no precip. 28°c
GPS Coordinates (Zone) 16T E 0682389 N 523371 Datum NAD83
Descriptive Location ~700m d/s of dam

Project Name Bow Lake Wind Farm
Project # 1609 60734
Field Staff NB, MF
Time 15:20

Water Quality
Dissolved Oxygen (mg/L) 8.13 pH 7.41 Conductivity (µS/cm) 51
Water Temperature (°C) 23.44 Air Temperature (°C) 27°c
Time *in situ* measurements taken 15:30

Watercourse Dimensions & Morphology
Mean Watercourse Width ~~55~~ 235 (m) Maximum Pool Depth 1.0 (m) } Montreal Rv.
Mean Bankfull Width ~~70~~ 285 (m) m.p. Mean Water Depth 1.0 (m) }
% Riffle 40 % Pool 60 % Run % Flat
Evidence of eroding banks, Comments on bank stability none - boulders along shoreline

Substrate (% cover)
Bedrock 30 Cobble 30 Sand Silt 10 Muck
20 Boulder Gravel Clay Marl 10 Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
5% water has receeded away from riparian veg. (dam)
Adjacent Land Use
dam, forest

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
spawn, forage, nursery
Migratory Obstructions (seasonal, permanent)
none
Note any fish observations none

Waterbody Notes
Natural Watercourse ✓ Trapezoidal Channel Grassed Swale Buried Tile
Surficial Drainage (i.e. furrows) Dugout Pond Dominated by Aquatic Veg Dry

Other Habitat Notes, Incidental Wildlife Observations, etc.

Field Notes Authored by MF Field Notes QA/QCed by NB

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WIND FARM WATERBODY RAPID ASSESSMENT FORM

MT sets

Stantec

Station # 9B-1
Project Name Bow Lake Wind Farm
Watercourse Name unknown
Project # 160960734
Photos 566-569
Field Staff NB, MF
Date July 11/12
Time 14:30
Weather conditions in previous 24 hrs no precip. Hot, 27°c
GPS Coordinates (Zone) 16T E 0682638 N 5233371 Datum NAD83
Descriptive Location ~100 m south of Gate#2 heading south off Hogg Dam Rd.

Water Quality
Dissolved Oxygen (mg/L) 7.85 pH 7.34 Conductivity (µS/cm) 53
Water Temperature (°C) 18.73 Air Temperature (°C) 27°c
Time *in situ* measurements taken 14:40

Watercourse Dimensions & Morphology
Mean Watercourse Width 1.2 (m) Maximum Pool Depth 0.6 (m)
Mean Bankfull Width 2.5 (m) Mean Water Depth 20 (cm)
40 % Riffle 10 % Pool 40 % Run 10 % Flat
Evidence of eroding banks, Comments on bank stability minor undercut u/s of culverts

Substrate (% cover)
Bedrock 30 Cobble 20 Sand Silt Muck
10 Boulder 30 Gravel Clay Marl 10 Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
80% Buffalo berry, Sugar maple, fern sp.
Adjacent Land Use
Hogg Dam Rd, Hydro Corridor

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
Spawn, nursery, forage
Migratory Obstructions (seasonal, permanent)
none observed
Note any fish observations schools of Northern Redbelly dace + 2 Brook trout ~20 m d/s of Hogg Rd

Waterbody Notes
Natural Watercourse ✓ Trapezoidal Channel Grassed Swale Buried Tile
Surficial Drainage (i.e. furrows) Dugout Pond Dominated by Aquatic Veg Dry

Other Habitat Notes, Incidental Wildlife Observations, etc. No u/s + d/s waypoints as delineated already and connects to Montreal River.
Permanent, Direct 0

Field Notes Authored by MF Field Notes QA/QCed by NB

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WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

9B-2 u/s = 0682582 5233320
9B-2 d/s = 0682569 5233351

#Dry. No fishing

Station # 9B-2
Watercourse Name unknown
Photos 570-572
Date July 11/12

Project Name Bow Lake Wind Farm
Project # 1609 60734
Field Staff NB, MF
Time 14:50

Weather conditions in previous 24 hrs no precip.
GPS Coordinates (Zone) 16T E — N — Datum NAD83
Descriptive Location ~20m south of gate #2 of Hogg Rd.

Water Quality

too shallow u/s (seep)

Dissolved Oxygen (mg/L) ____ pH ____ Conductivity (µS/cm) ____
Water Temperature (°C) ____ Air Temperature (°C) ____
Time *in situ* measurements taken ____

Watercourse Dimensions & Morphology

Mean Watercourse Width 0.3 (m) Maximum Pool Depth 10 (cm)
Mean Bankfull Width ____ (m) Mean Water Depth 5 (cm)
____ % Riffle 100 % Pool ____ % Run ____ % Flat
Evidence of eroding banks, Comments on bank stability none

u/s = silt/muck

Substrate (% cover)

d/s =

____ Bedrock ____ Cobble 40 Sand 20 Silt ____ Muck
____ Boulder 40 Gravel ____ Clay ____ Marl ____ Detritus

In-water Cover

Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other ____

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
40% floating pond weed, yellow birch
Adjacent Land Use
Hogg Rd, Hydro Corridor

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
possible spawn
Migratory Obstructions (seasonal, permanent)
dry
Note any fish observations none

Waterbody Notes

Natural Watercourse ✓ Trapezoidal Channel ____ Grassed Swale ____ Buried Tile ____
Surficial Drainage (i.e. furrows) ____ Dugout Pond ____ Dominated by Aquatic Veg ____ Dry ____

Other Habitat Notes, Incidental Wildlife Observations, etc.

Indirect, intermitent. Very minor def'n d/s
Dry d/s, standing water u/s (seep)

Field Notes Authored by MF Field Notes QA/QCed by NB

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~~9B-2 u/s~~ 9B-3 u/s = 0682595 5233346

WIND FARM WATERBODY RAPID ASSESSMENT FORM

No fishing - dry

Stantec

9B-3 d/s = 0682584 5233357

Station # 9B-3 | Project Name Bow Lake Wind Farm
Watercourse Name unknown | Project # 1609 60734
Photos 573-576 | Field Staff NB, MF
Date July 11/12 | Time 15:05
Weather conditions in previous 24 hrs No precip. 28°C
GPS Coordinates (Zone) 16T E — N — Datum NAD83
Descriptive Location ~2 m south of Gate #2 of Hogs Dam Rd

Water Quality

DRY

Dissolved Oxygen (mg/L) ____ pH ____ Conductivity (µS/cm) ____
Water Temperature (°C) ____ Air Temperature (°C) ____
Time *in situ* measurements taken ____

Watercourse Dimensions & Morphology

Mean Watercourse Width ~~0.5~~ (m) n/p. Maximum Pool Depth — (cm) Dry
Mean Bankfull Width 0.6 (m) Mean Water Depth — (cm)
— % Riffle — % Pool — % Run — % Flat
Evidence of eroding banks, Comments on bank stability none

Substrate (% cover)

Bedrock 10 Cobble 40 Sand 20 Silt ____ Muck ____
Boulder 30 Gravel ____ Clay ____ Marl ____ Detritus ____

In-water Cover

Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other ____

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
90% eastern white cedar, yellow birch
Adjacent Land Use
Hogs Dam Rd, Hydro corridor

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
possible spawn (connected to 9B-1)
Migratory Obstructions (seasonal, permanent)
dry
Note any fish observations none

Waterbody Notes

Natural Watercourse ✓ Trapezoidal Channel ____ Grassed Swale ____ Buried Tile ____
Surficial Drainage (i.e. furrows) ____ Dugout Pond ____ Dominated by Aquatic Veg ____ Dry ____

Other Habitat Notes, Incidental Wildlife Observations, etc.

~~9B us~~ = 9B-3 us = 0682595, 5233346

Field Notes Authored by MF Field Notes QA/QCed by NB

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WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # Fo-12
Project Name Bow Lake Wind Farm
Watercourse Name Unnamed
Project # 1609 60971
Photos
Field Staff MEllah, N Leawa
Date July 15 2013
Time 10:20
Weather conditions in previous 24 hrs clear ~25°C
U/S GPS Coordinates (Zone) 16T E 682771 N 5233341 Datum NAD83
Descriptive Location

Water Quality

Dissolved Oxygen (mg/L) 9.81 pH 7.2 Conductivity (µS/cm) 43
Water Temperature (°C) 15.07 Air Temperature (°C) ~23°C
Time *in situ* measurements taken 10:30

Watercourse Dimensions & Morphology

Mean Watercourse Width 3.0 (m) Maximum Pool Depth 30 (cm)
Mean Bankfull Width 4.0 (m) Mean Water Depth 10 (cm)
40 % Riffle 30 % Pool 30 % Run % Flat
Evidence of eroding banks, Comments on bank stability stable banks supported by substrate, ground cover, herbaceous veg, trees & shrubs

Substrate (% cover)

1 Bedrock 20 Cobble 50 Sand Silt Muck
5 Boulder 20 Gravel Clay Marl 4 Detritus

In-water Cover

Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
90% - mixed forest dominant sugar maple & birch with balsam fir
Adjacent Land Use
Hogg Dam Rd., forest

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
ideal habitat for cold water species
Migratory Obstructions (seasonal, permanent)
none observed
Note any fish observations none observed

Waterbody Notes

Natural Watercourse ✓ Trapezoidal Channel Grassed Swale Buried Tile
Surficial Drainage (i.e. furrows) Dugout Pond Dominated by Aquatic Veg Dry

Other Habitat Notes, Incidental Wildlife Observations, etc.

Field Notes Authored by MEllah Field Notes QA/QCed by

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WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 10-22
Project Name Bow Lake Wind Farm
Watercourse Name Unnamed Pond
Project # 160960734
Photos 1044, 1045
Field Staff M. Johns, M. Ellah
Date July 7/12
Time 15:30
Weather conditions in previous 24 hrs mix sun & cloud, light rain last night
GPS Coordinates (Zone) 16T E 684133 N 5234664 Datum NAD83
Descriptive Location small pond on North side of road, beneath hydro towers/line

Water Quality
Dissolved Oxygen (mg/L) 5.58 pH 5.36 Conductivity (µS/cm) 19
Water Temperature (°C) 30.1 Air Temperature (°C) ~26°C (estimated) → 27.5 measured
Time *in situ* measurements taken 15:30

Watercourse Dimensions & Morphology — POND
Mean Watercourse Width / (m) Maximum Pool Depth 0.8 m (cm) Max Pond Depth
Mean Bankfull Width / (m) Mean Water Depth 30 (cm)
/ % Riffle / % Pool / % Run / % Flat
Evidence of eroding banks, Comments on bank stability /

Substrate (% cover)
Bedrock Cobble Sand Silt Muck
Boulder Gravel Clay Marl 100 Detritus

In-water Cover Not Applicable
Cover Types Present (circle): Undercut Banks ~~Deep Pool~~ Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
0%
Adjacent Land Use
Hydro corridor, roadway

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
None
Migratory Obstructions (seasonal, permanent)
Not Applicable (road blocks downstream flow to valley
Note any fish observations Not - Not fish habitat

Waterbody Notes → Small Pond
Natural Watercourse Trapezoidal Channel Grassed Swale Buried Tile
Surficial Drainage (i.e. furrows) Dugout Pond Dominated by Aquatic Veg Dry

Other Habitat Notes, Incidental Wildlife Observations, etc.
Adult eastern newt, green frogs, dragon fly nymph
Temperatures re-checked. Pond is warmer than air temperature.

Field Notes Authored by Mike Johns Field Notes QA/QCed by MEllah

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # 10-14
Project Name Bow Lake Wind Farm
Watercourse Name unnamed
Project # 1609 60734
Photos 0982-0985
Field Staff MEllah, M Johns
Date July 6/12
Time 15:40
Weather conditions in previous 24 hrs sunny, hot & humid, no precip, light wind NW
GPS Coordinates (Zone) 16T E 684318 N 5234730 Datum NAD83
Descriptive Location northeast of current road that runs along Montreal River Hogg Dam Road.

Water Quality
Dissolved Oxygen (mg/L) 5.26 pH 5.39 Conductivity (µS/cm) 28
Water Temperature (°C) 27.93 Air Temperature (°C) 25°C
Time *in situ* measurements taken 15:55

Watercourse Dimensions & Morphology
Mean Watercourse Width pond (m) Maximum Pool Depth 200 (cm)
Mean Bankfull Width pond (m) Mean Water Depth 150 (cm)
/ % Riffle 100 % Pool / % Run / % Flat
Evidence of eroding banks, Comments on bank stability
Sand section of shoreline eroding into pond - other banks stable

Substrate (% cover)
30 Bedrock Cobble 30 Sand 20 Silt Muck
Boulder Gravel Clay Marl 20 Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks (Deep Pool) Watercress (Aquatic Veg)
Overhanging Vegetation (Woody Debris) Boulder Other

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
0% - surrounding forest mixed, white pine, white spruce, red maple
Adjacent Land Use
roadside, hydrolines, forest

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, (groundwater upwellings))
possible groundwater source - stained substrate iron colour
Migratory Obstructions (seasonal, (permanent))
natural dam, road + culvert
Note any fish observations none

Waterbody Notes
Natural Watercourse ✓ Trapezoidal Channel Grassed Swale Buried Tile
Surficial Drainage (i.e. furrows) Dugout Pond Dominated by Aquatic Veg Dry

Other Habitat Notes, Incidental Wildlife Observations, etc.
green frog, wood frog, Am. toad tadpoles, green frog tadpoles
* 2nd pond hydrologically connected to 1st pond (10-14) survey location

Field Notes Authored by MEllah Field Notes QA/QCed by ME

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WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # FO-17
Project Name Bow Lake Wind Farm
Watercourse Name unnamed
Project # 160960771
Photos 1161-1162
Field Staff MEllah, N Leava
Date July 15/2013
Time 12:45
Weather conditions in previous 24 hrs clear ~25°C
GPS Coordinates (Zone) 16T E 685109 N 5234801 Datum NAD83
Descriptive Location Montreal River Bay

Water Quality STEEP BANKS PREVENTED WATER ACCESS FOR WATER QUALITY

Dissolved Oxygen (mg/L) _____ pH _____ Conductivity (µS/cm) _____
Water Temperature (°C) _____ Air Temperature (°C) _____
Time *in situ* measurements taken _____

Watercourse Dimensions & Morphology need detailed bathymetry

Mean Watercourse Width ~70 (m) Maximum Pool Depth n/a (cm)
Mean Bankfull Width ~70 (m) Mean Water Depth n/a (cm)
_____% Riffle _____% Pool _____% Run 100 % Flat
Evidence of eroding banks, Comments on bank stability stable banks supported by bedrock, ground cover, trees + shrubs

Substrate (% cover) unable to access shoreline for substrate assessment

_____Bedrock _____Cobble _____Sand _____Silt _____Muck
_____Boulder _____Gravel _____Clay _____Marl _____Detritus

In-water Cover

Cover Types Present (circle): Undercut Banks Deep Pool Watercress ~~Aquatic Veg~~
Overhanging Vegetation ~~Woody Debris~~ Boulder Other _____

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
50% coverage - dominant spruce, mixed forest - mid successional
Adjacent Land Use
Montreal River, forest

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Bay connected to Montreal River - bay provides spawning, foraging + rearing habitat
Migratory Obstructions (seasonal, permanent)
none observed
Note any fish observations none observed

Waterbody Notes

Natural Watercourse ✓ Trapezoidal Channel ____ Grassed Swale ____ Buried Tile ____ Seep ____
Surficial Drainage (i.e. furrows) ____ Dugout Pond ____ Dominated by Aquatic Veg ____ Dry ____

Other Habitat Notes, Incidental Wildlife Observations, etc. _____

Field Notes Authored by MEllah Field Notes QA/QCed by _____

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # FO-16
Project Name Bow Lake Wind Farm
Watercourse Name tributary to Montreal River
Project # 1609 60771
Photos 1158-1160, 1163-1165
Field Staff MEllah, N Leaua
Date July 15/2013
Time 12:15
Weather conditions in previous 24 hrs clear ~ 30°C
u/s GPS Coordinates (Zone) 16T E 685142 N 5234695 Datum NAD83
Descriptive Location tributary of Montreal River

Water Quality

Dissolved Oxygen (mg/L) 10.39 pH 7.13 Conductivity (µS/cm) 40
Water Temperature (°C) 12.6 Air Temperature (°C) 30
Time *in situ* measurements taken 12:20

Watercourse Dimensions & Morphology bankfull wide which appears to be from high rainfall/ melt events - typical flow low, sourced from seep

Mean Watercourse Width 0.2 (m) Maximum Pool Depth 5.0 (cm)
Mean Bankfull Width 3.0 (m) Mean Water Depth 2.0 (cm)
60 % Riffle 20 % Pool 20 % Run % Flat
Evidence of eroding banks, Comments on bank stability stable banks supported by substrate, ground cover, trees, shrubs & herbaceous plants

Substrate (% cover)

Bedrock Cobble 80 Sand Silt Muck
Boulder 20 Gravel Clay Marl Detritus

In-water Cover

Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
80% shade - mixed forest, dominant sugar maple, birch & balsam fir - mid succession
Adjacent Land Use
Forest, Montreal River, Road (near origin)

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
indirect habitat, providing cold water source to Montreal River
Migratory Obstructions (seasonal, permanent)
low water levels
Note any fish observations none observed

Waterbody Notes

Natural Watercourse ✓ Trapezoidal Channel ____ Grassed Swale ____ Buried Tile ____ Seep ____
Surficial Drainage (i.e. furrows) ____ Dugout Pond ____ Dominated by Aquatic Veg ____ Dry ____

Other Habitat Notes, Incidental Wildlife Observations, etc.

Field Notes Authored by MEll Field Notes QA/QCed by

10-29 u/s = 0685095 5234614
10-29 d/s = 0685208 5234667

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Too low to fish

Stantec

Station # 10-29
Project Name Bow Lake Wind Farm
Watercourse Name unknown
Project # 160960734
Photos 524-526
Field Staff NB, MF
Date July 9/12
Time 12:55
Weather conditions in previous 24 hrs no precip. Hot, muggy (28°c)
GPS Coordinates (Zone) 16T E N Datum NAD83
Descriptive Location Runs along north ditch to McKay rd

Water Quality
Dissolved Oxygen (mg/L) 9.33 pH 7.00 Conductivity (µS/cm) 52
Water Temperature (°C) 10.71 Air Temperature (°C) 27°c
Time *in situ* measurements taken 12:50

Watercourse Dimensions & Morphology
Mean Watercourse Width 0.4 (m) Maximum Pool Depth 5 (cm)
Mean Bankfull Width 0.5 (m) Mean Water Depth 2 (cm)
10 % Riffle 50 % Pool % Run 40 % Flat
Evidence of eroding banks, Comments on bank stability minor scour

Substrate (% cover)
Bedrock 20 Cobble 20 Sand Silt Muck
Boulder 30 Gravel Clay Marl 30 Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
80% sugar maple, fern sp.
Adjacent Land Use
McKay Rd.

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
Possible spawn
Migratory Obstructions (seasonal, permanent)
lack of water
Note any fish observations none

Waterbody Notes
Natural Watercourse ✓ Trapezoidal Channel ✓ Grassed Swale Buried Tile
Surficial Drainage (i.e. furrows) Dugout Pond Dominated by Aquatic Veg Dry

Other Habitat Notes, Incidental Wildlife Observations, etc.
10-29 u/s = 0685095, 5234614
10-29 d/s = 0685208, 5234667

Field Notes Authored by MF Field Notes QA/QCed by NB

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10-27 d/s = 0685000 5234750

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Fisheable

Stantec

Station # 10-27
Project Name Bow Lake Wind Farm
Watercourse Name unknown
Project # 1609 60734
Photos 616-520
Field Staff NB, MF
Date July 9 /12
Time 12:10
Weather conditions in previous 24 hrs no precip. Hot + muggy (28°c)
GPS Coordinates (Zone) 16T E N° Datum NAD83
Descriptive Location On McKay rd ~ 1.3 km west of proposed substation + ~170 m north of Montreal Rv.

Water Quality

Dissolved Oxygen (mg/L) 8.30 pH 7.27 Conductivity (µS/cm) 23
Water Temperature (°C) 10.37 Air Temperature (°C) 27°c
Time *in situ* measurements taken 12:20

Watercourse Dimensions & Morphology

Mean Watercourse Width 0.7 (m) Maximum Pool Depth 15 (cm)
Mean Bankfull Width 2.0 (m) Mean Water Depth 8 (cm)
30 % Riffle 10 % Pool 60 % Run ____ % Flat
Evidence of eroding banks, Comments on bank stability minor under cut banks

Substrate (% cover)

Bedrock 30 Cobble 30 Sand ____ Silt ____ Muck ____
Boulder 30 Gravel ____ Clay ____ Marl 10 Detritus ____

In-water Cover

Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other ____

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
100% sugar maple, fern sp, yellow birch
Adjacent Land Use
McKay Rd, Hydro Corridor

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
spawn
Migratory Obstructions (seasonal, permanent)
perched culvert maybe steep gradient
Note any fish observations

Waterbody Notes

Natural Watercourse ✓ Trapezoidal Channel ____ Grassed Swale ____ Buried Tile ____
Surficial Drainage (i.e. furrows) ____ Dugout Pond ____ Dominated by Aquatic Veg ____ Dry ____

Other Habitat Notes, Incidental Wildlife Observations, etc.

Direct, permanent 10-27 u/s = 0685193, 5234427
10-27 d/s = 0685000, 5234750

Field Notes Authored by MF Field Notes QA/QCed by NB

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10-28 u/s = 0685252 5234522
10-28 d/s = 0685246 5234668

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Too shallow to fish

Stantec

Station # 10-28
Watercourse Name unknown
Photos 521-523
Date July 9/12
Weather conditions in previous 24 hrs no precip. Hot and muggy (28°c)
GPS Coordinates (Zone) 16T E N Datum NAD83
Descriptive Location on McKay Rd ~ 1.2 km west of proposed substation

Project Name Bow Lake Wind Farm
Project # 1609 60734
Field Staff NB, MF
Time 12:30

Water Quality
Dissolved Oxygen (mg/L) 9.49 pH 7.14 Conductivity (µS/cm) 29
Water Temperature (°C) 11.02 Air Temperature (°C) 27°c
Time *in situ* measurements taken 12:35

Watercourse Dimensions & Morphology
Mean Watercourse Width 0.25 (m) Maximum Pool Depth 4 (cm)
Mean Bankfull Width 10 (m) Mean Water Depth 2 (cm)
30 % Riffle 20 % Pool 50 % Run % Flat
Evidence of eroding banks, Comments on bank stability none observed

Substrate (% cover)
Bedrock 40 Cobble 30 Sand Silt Muck
10 Boulder Gravel Clay Marl 20 Detritus

In Water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
100% Sugar maple, fern sp
Adjacent Land Use
McKay rd.

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
none - disappears underground before McKy Rd.
Migratory Obstructions (seasonal, permanent)
goes underground
Note any fish observations None

Waterbody Notes
Natural Watercourse ✓ Trapezoidal Channel Grassed Swale Buried Tile
Surficial Drainage (i.e. furrows) Dugout Pond Dominated by Aquatic Veg Dry

Other Habitat Notes, Incidental Wildlife Observations, etc.
10-28 u/s = 0685252, 5234522
10-28 d/s = 0685246, 5234668

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Stantec

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Station # FO-15
Watercourse Name unnamed
Photos 1155 - 1157
Date July 15/2013
Weather conditions in previous 24 hrs clear ~25°C
u/s GPS Coordinates (Zone) 16T E 685214 N 5234693 Datum NAD83
Descriptive Location FO-15 d/s GPS 16T 685223 E, 5234755 N

Project Name Bowlake Wind Farm
Project # 160960771
Field Staff MEllah, NLeava
Time 12:00

Water Quality

Dissolved Oxygen (mg/L) 10.44 pH 7.00 Conductivity (µS/cm) 21
Water Temperature (°C) 11.75 Air Temperature (°C) 25
Time *in situ* measurements taken 12:05

Watercourse Dimensions & Morphology

Mean Watercourse Width 0.3 (m) Maximum Pool Depth 4.0 (cm)
Mean Bankfull Width 0.5 (m) Mean Water Depth 3.0 (cm)
60 % Riffle 20 % Pool 20 % Run ____ % Flat
Evidence of eroding banks, Comments on bank stability stable banks supported with substrate, ground cover, trees/shrubs, herbaceous plants.

Substrate (% cover)

____ Bedrock 20 Cobble 50 Sand ____ Silt ____ Muck
____ Boulder 30 Gravel ____ Clay ____ Marl ____ Detritus

In-water Cover

Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other ____

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
90% cover - mixed forest dominant sugar maple, birch, balsam fir
Adjacent Land Use
Forest, Montreal River

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
indirect fish habitat - cold water source for Montreal River
Migratory Obstructions (seasonal, permanent)
high gradient
Note any fish observations none observed

Waterbody Notes

Natural Watercourse ✓ Trapezoidal Channel ____ Grassed Swale ____ Buried Tile ____ Seep ____
Surficial Drainage (i.e. furrows) ____ Dugout Pond ____ Dominated by Aquatic Veg ____ Dry ____

Other Habitat Notes, Incidental Wildlife Observations, etc.

Field Notes Authored by MEllah Field Notes QA/QCed by ____

10-25 d/s = 0685150 5234876

WIND FARM WATERBODY RAPID ASSESSMENT FORM

NT set. @ d/s culverts of McKay Rd.

Stantec

Station # 10-25
Project Name Bow Lake Wind Farm
Watercourse Name unknown trib to Mont. Ru.
Project # 1609 60734
Photos 505-508 + 509-511
Field Staff NB, MF
Date July 9 /12
Time 11:10
Weather conditions in previous 24 hrs no precip. Hot, muggy 28°c → NT traps
GPS Coordinates (Zone) 16T E 0685308 N 5234772 Datum NAD83
Descriptive Location @ McKay Rd crossing ~300m west of proposed substation.

Water Quality
Dissolved Oxygen (mg/L) 9.79 pH 7.13 Conductivity (µS/cm) 54
Water Temperature (°C) 12.20 Air Temperature (°C) 28°c
Time *in situ* measurements taken 11:15

Watercourse Dimensions & Morphology
Mean Watercourse Width 2.5 (m) Maximum Pool Depth 60 (cm)
Mean Bankfull Width 4.5 (m) Mean Water Depth 10 (cm)
40 % Riffle 10 % Pool 40 % Run 10 % Flat
Evidence of eroding banks, Comments on bank stability ~~[illegible]~~ mod undercut banks

Substrate (% cover)
Bedrock 30 Cobble 30 Sand Silt Muck
10 Boulder 30 Gravel Clay Marl Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
80% Mountain maple, yellow birch, sugar maple.
Adjacent Land Use
McKay Rd, Hydro corridor, Montreal Ru.

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
Spawn, Nursery, forage
Migratory Obstructions (seasonal, permanent)
Perched culverts @ d/s end.
Note any fish observations none

Waterbody Notes
Natural Watercourse ✓ Trapezoidal Channel Grassed Swale Buried Tile
Surficial Drainage (i.e. furrows) Dugout Pond Dominated by Aquatic Veg Dry

Other Habitat Notes, Incidental Wildlife Observations, etc.
Direct, Permanent 10-25 u/s = 0685527, 5234553
10-25 d/s = 0685150, 5234876

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WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # FD-14
Project Name Bow lake wind Farm
Watercourse Name trib of Montreal River
Project # 160960771
Photos 1150-1154
Field Staff MEllch, N Leawa
Date July 15/2013
Time 11:45
Weather conditions in previous 24 hrs clear ~28°C
d/s GPS Coordinates (Zone) 16T E 685190 N 5234769 Datum NAD83
Descriptive Location at bay
u/s at road 16T 685308E, 5234775N

Water Quality
Dissolved Oxygen (mg/L) 11.15 pH 7.20 Conductivity (µS/cm) 35
Water Temperature (°C) 13.75 Air Temperature (°C) 30
Time *in situ* measurements taken 11:50

Watercourse Dimensions & Morphology
Mean Watercourse Width 1.5 (m) Maximum Pool Depth 15 (cm)
Mean Bankfull Width 2.0 (m) Mean Water Depth 8.0 (cm)
30 % Riffle 30 % Pool 30 % Run 10 % Flat
Evidence of eroding banks, Comments on bank stability stable banks supported by substrate, ground cover, trees & shrubs

Substrate (% cover)
Bedrock 30 Cobble 30 Sand Silt Muck
Boulder 40 Gravel Clay Marl Detritus

In-water Cover
Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other

Riparian Zone
Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
70% cover - mixed forest - sugar maple, birch, balsam fir - mid successional
Adjacent Land Use
Montreal River Forest, Hogg Dam Rd.

Fish Habitat Potential
Critical Habitat (spawning or nursery areas, groundwater upwellings)
potential spawning for cold water species, indirect habitat providing coldwater source for montreal River
Migratory Obstructions (seasonal, permanent)
none observed
Note any fish observations none observed

Waterbody Notes
Natural Watercourse ✓ Trapezoidal Channel ____ Grassed Swale ____ Buried Tile ____ Seep ____
Surficial Drainage (i.e. furrows) ____ Dugout Pond ____ Dominated by Aquatic Veg ____ Dry ____

Other Habitat Notes, Incidental Wildlife Observations, etc.

Field Notes Authored by MEllch Field Notes QA/QCed by

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WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # FO - 13
Watercourse Name Montreal River
Photos 1147 - 1149
Date July 15/2013

Project Name Bow Lake Wind Farm
Project # 1604 60741
Field Staff MEllah, N Leava
Time 11:20

Weather conditions in previous 24 hrs clear ~25°C
GPS Coordinates (Zone) 16T E 685193 N 5234809 Datum NAD83
Descriptive Location

Water Quality

Dissolved Oxygen (mg/L) 6.37 pH 6.52 Conductivity (µS/cm) 48
Water Temperature (°C) 21.54 Air Temperature (°C) ~25°C
Time *in situ* measurements taken 11:30

Watercourse Dimensions & Morphology

Mean Watercourse Width 50 (m) - bay of Montreal River Maximum Pool Depth ~40 (cm)
Mean Bankfull Width 50 (m) Mean Water Depth ~30 (cm)
____% Riffle ____% Pool ____% Run 100 % Flat
Evidence of eroding banks, Comments on bank stability stable banks supported by aquatic vegetation (sedges & shrubs) & trees

Substrate (% cover)

	Bedrock		Cobble		Sand		Silt	20	Muck
	Boulder		Gravel		Clay		Marl	80	Detritus

In-water Cover

Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
5% cover with mid successional mixed forest dominant spruce
Adjacent Land Use
Hogg Dam Rd, Montreal River, forest

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
ideal spawning for Northern Pike, nursery for young & small bodied fish
Migratory Obstructions (seasonal, permanent)
none - connected to River (Montreal) & connected to FO-14
Note any fish observations cyprinids observed near shore

Waterbody Notes

Natural Watercourse ✓ Trapezoidal Channel ____ Grassed Swale ____ Buried Tile ____
Surficial Drainage (i.e. furrows) ____ Dugout Pond ____ Dominated by Aquatic Veg ____ Dry ____

Other Habitat Notes, Incidental Wildlife Observations, etc.

Field Notes Authored by MEllah Field Notes QA/QCed by

WIND FARM WATERBODY RAPID ASSESSMENT FORM

Stantec

Station # FO-18
Project Name Bow Lake Wind Farm
Watercourse Name unnamed
Project # 1609 60771
Photos 1166 - 1168
Field Staff MEllah, N Leava
Date July 15/2013
Time 13:30
Weather conditions in previous 24 hrs clear, ~25°C
GPS Coordinates (Zone) 16T E 685528 N 5235103 Datum NAD 83
Descriptive Location Montreal River Bay

Water Quality

Dissolved Oxygen (mg/L) 8.57 pH 7.2 Conductivity (µS/cm) 42
Water Temperature (°C) 26.34 Air Temperature (°C) ~30
Time *in situ* measurements taken 13:35

Watercourse Dimensions & Morphology

Mean Watercourse Width ~200 (m) Maximum Pool Depth n/a (cm)
Mean Bankfull Width ____ (m) Mean Water Depth n/a (cm)
____ % Riffle ____ % Pool ____ % Run 100 % Flat
Evidence of eroding banks, Comments on bank stability stable banks supported with trees / shrubs, substrat

Substrate (% cover) – at shoreline

____ Bedrock 25 Cobble 50 Sand ____ Silt ____ Muck
____ Boulder 25 Gravel ____ Clay ____ Marl ____ Detritus

In-water Cover

Cover Types Present (circle): Undercut Banks Deep Pool Watercress Aquatic Veg
Overhanging Vegetation Woody Debris Boulder Other ____

Riparian Zone

Riparian Cover (% of watercourse shaded, dominant vegetation, mature or early successional)
50% coverage - mixed forest dominant spruce - mature
Adjacent Land Use
Montreal River forest

Fish Habitat Potential

Critical Habitat (spawning or nursery areas, groundwater upwellings)
Connected to Montreal River - provides habitat for fish - spawning, forage, rearing
Migratory Obstructions (seasonal, permanent)
none
Note any fish observations unidentified yoy observed near shore

Waterbody Notes

Natural Watercourse ✓ Trapezoidal Channel ____ Grassed Swale ____ Buried Tile ____ Seep ____
Surficial Drainage (i.e. furrows) ____ Dugout Pond ____ Dominated by Aquatic Veg ____ Dry ____

Other Habitat Notes, Incidental Wildlife Observations, etc. ____

Field Notes Authored by MEllah Field Notes QA/QCed by ____

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Appendix C:

Photographic Records

Photo 1: Station 0-3 – Unnamed water body – Facing upstream (southwest) showing water body channel with isolated pools and detritus, sand and cobble substrate.

Photo 2: Station 0-3 – Unnamed water body – Facing downstream (northeast) showing meandering water body channel.

Photo 3: Station 0-2 – Unnamed water body – Facing downstream (northeast) showing water body channel.

Photo 4: Station 0-2 – Unnamed water body– Showing road culvert and sand, silt and gravel substrate.

Photo 5: Station 0-2 – Unnamed water body – Facing upstream (southwest) showing water body channel.

Photo 6: Station FO-2 – Unnamed water body – Southwest of Hogg Dam Road showing sand, gravel, and cobble substrate.

Photo 7: Station FO-2 – Unnamed water body – Showing culvert at Hog Dam Road, 40 cm diameter.

Photo 8: Station FO-2 – Unnamed water body northeast of Hog Dam Road –facing upstream showing boulder dominated substrate.

Photo 9: Station FO-2 – Unnamed water body – Shallow pool northeast of Hogg Dam Road, bedrock substrate.

Photo 10: Station FO-3 – Unnamed water body – Facing south, upstream of dammed water body.

Photo 11: Station FO-3 – Unnamed water body – Facing north, downstream of dammed water body.

Photo 12: Station FO-3 – Unnamed water body – Facing south, showing limit of water body.

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Photo 13: Station FO-5 – Unnamed water body – Facing south, downstream of road.

Photo 14: Station FO-5 – Unnamed water body – Origin of seep.

Photo 15: Station FO-5 – Unnamed water body – Showing overland flow from seep through marshy area.

Photo 16: Station FO-4 – Unnamed water body – Facing south showing origin of defined channel.

Photo 17: Station FO-4 – Unnamed water body – Facing west showing channel along roadside with gravel substrate.

Photo 18: Station FO-4 – Unnamed water body – Culvert on north side of road showing flowing water.

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Photo 19: Station FO-4 – Unnamed water body – Facing north, showing channel downslope from culvert.

Photo 20: Station FO-6 – Unnamed water body – Facing upstream (south), showing stream overview.

Photo 21: Station FO-6 – 2 – Unnamed water body – Facing downstream (north), showing stream overview.

Photo 22: Station 9B-11 – Unnamed water body – Facing upstream (east), showing water body overview.

Photo 23: Station 9B-11 – Unnamed water body – Facing downstream (west), showing channel overview.

Photo 24: Station 9B-11 – Unnamed water body – Showing sand, cobble and gravel substrate.

Photo 25: Station 9B-10 – Unnamed water body– Facing upstream (east), showing water body channel.

Photo 26: Station 9B-10 – Unnamed water body – Facing downstream (west) showing water body channel and culvert.

Photo 27: Station 9B-9 and FO-21 – Montreal River – Facing upstream (north) showing bay of Montreal River.

Photo 28: Station 9B-9 and FO-21 – Montreal River – Facing downstream (south) showing bay of Montreal River.

Photo 29: Station 9B-9 & FO-21 – Montreal River – Showing gravel, cobble, and sand substrate.

Photo 30: Station 9B-8 – Unnamed water body – Facing upstream (southeast) showing pool morphology.

Photo 31: Station 9B-8 – Unnamed water body – Facing downstream (northwest) showing shallow water body.

Photo 32: Station 9B-8 – Unnamed water body – Showing gravel and cobble substrate.

Photo 33: Station FO-8 – Unnamed water body – Showing water body overview.

Photo 34: Station FO-8 – Unnamed water body – Facing downstream (north) showing downstream limit of water body.

Photo 35: Station FO-7 – Unnamed water body – Facing east, adjacent to south side of road.

Photo 36: Unnamed water body – Showing downstream limit of water body, facing the road.

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Photo 37: Station FO-9 – Unnamed water body – Showing pools along roadside.

Photo 38: Station FO-10 – Unnamed water body – Facing south showing upstream overview.

Photo 39: Station FO-10 – Unnamed water body – Facing north, showing downstream overview.

Photo 40: Station FO-11 – Facing downstream (north) showing overview of channel.

Photo 41: Station FO-11 – Unnamed water body – Facing north showing origin of stream at location adjacent to road.

Photo 42: Station 9B-5 –Unnamed water body – Facing upstream (south) showing water body adjacent to Hogg Dam Road.

Photo 43: Station 9B-5 – Unnamed water body – Facing downstream (northwest) showing water body and culvert.

Photo 44: Station 9B-5 –Unnamed water body – Showing gravel, sand, and cobble substrate.

Photo 45: Station 9B-4 – Montreal River – Facing downstream (west) showing bay of Montreal River bay at mouth of 9B-1.

Photo 46: Station 9B-4 – Unnamed water body – Facing bay (west) on Montreal River.

Photo 47: Station 9B-4 – Montreal River – Showing sand, cobble, and boulder substrate.

Photo 48: Station 9B-1 – Unnamed water body – Facing upstream (east) showing channel overview.

Photo 49: Station 9B-1 – Unnamed water body – Facing downstream (west) showing channel overview.

Photo 50: Station 9B-1 – Unnamed water body – Facing upstream (east) showing Hogg Dam Road culverts.

Photo 51: Station 9B-1 – Unnamed water body – Showing gravel, cobble, and sand substrate.

Photo 52: Station 9B-2 – Unnamed water body – Facing upstream (east) showing channel overview.

Photo 53: Station 9B-2 – Unnamed water body – Facing upstream (east) showing standing water in seepage area.

Photo 54: Station 9B-2 – Unnamed water body – Facing downstream (west) showing culvert and dry, narrow channel.

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Photo 55: Station 9B-2 – Unnamed water body – Showing gravel, sand, and silt substrate.

Photo 56: Station 9B-3 – Unnamed water body – Facing upstream (east) showing meandering water body channel.

Photo 57: Station 9B-3 – Unnamed water body – Facing downstream (west) showing channel overview.

Photo 58: Station 9B-3 – Unnamed water body – Showing dominant sand, gravel and cobble substrate.

Photo 59: Station FO-12 – Unnamed water body – Facing upstream (south) at limit of 120 m Zone of Investigation.

Photo 60: Station FO-12 – Facing downstream (north) at limit of 120 m Zone of Investigation.

Photo 61: Station 10-22 – Unnamed water body – Facing downstream (northwest) showing small pond on north side of Hogg Dam Road.

Photo 62: Station 10-22 – Unnamed water body – Facing downstream (northeast) showing alternate view of small pond on north side of Hogg Dam Road.

Photo 63: Station 10-14 – Unnamed water body – Facing downstream (west) showing water body. Pond created by natural bedrock dam (visible in left background).

Photo 64: Station 10-14 – Unnamed water body – Facing downstream (north) showing aquatic vegetation and dead stump.

Photo 65: Station 10-14 – Unnamed pond – Facing upstream (east) showing natural bedrock barrier.

Photo 66: Station FO-17 – Montreal River – Facing upstream (west) showing overview of bay.

Photo 67: Station FO-17 – Montreal River - Facing upstream (west), showing alternate overview of bay.

Photo 68: Station FO-16 – Unnamed water body – Showing sand and gravel substrate immediately downstream of road culvert.

Photo 69: Station FO-16 – Unnamed water body – Origin of water body.

Photo 70: Station 10-29 – Unnamed water body – Facing upstream (west) showing channel overview.

Photo 71: Station 10-29 – Unnamed water body – Facing downstream (east) showing channel overview.

Photo 72: Station 10-29 – Unnamed water body – Showing gravel, cobble, and sand substrate.

Photo 73: Station 10-27 – Unnamed water body – Facing downstream (north) showing channel overview and culvert.

Photo 74: Station 10-27 – Unnamed water body – Facing upstream (south) on north side of McKay Roads showing perched culvert.

Photo 75: Station 10-27 – Unnamed water body – Facing upstream (south) showing channel overview.

Photo 76: Station 10-27 – Unnamed water body – Showing cobble, gravel, and sand substrate.

Photo 77: Station 10-28 – Unnamed water body – Facing upstream (south) showing water body flowing over steep bedrock.

Photo 78: Station 10-28 – Unnamed water body – Facing downstream (north) showing confluence of narrow, shallow water bodies (10-27 left, 10-28 right).

Photo 79: Station 10-28 – Unnamed water body – Showing downstream limit of water body. Note absence of channelized flow.

Photo 80: Station FO-15 – Unnamed water body – Facing downstream (north) showing pool morphology farther downstream from photo 82.

Photo 81: Station FO-15 –Facing upstream (south) showing origin of water body.

Photo 82: Station FO-15 – Unnamed water body – Facing downstream (north) showing channel immediately downstream of origin.

Photo 83: Station 10-25 – Unnamed water body – Facing upstream (southeast) showing channel overview.

Photo 84: Station 10-25 – Unnamed water body – Facing downstream (northwest) showing cobble, gravel, and sand substrate.

Photo 85: Station 10-25 – Unnamed water body – Facing upstream (south) showing cobble substrate and perched road culverts.

Photo 86: Station FO-14 – Unnamed water body – Facing upstream (south) showing channel overview.

Photo 87: Station FO-13 – Montreal River – Facing upstream (south) showing channel overview.

Photo 88: Station FO-13 – Montreal River – Facing downstream (north) showing confluence of water body with Montreal River.

Photo 89: Station FO-18 –Montreal River – Facing north showing bay on river.

Photo 90: Station FO-18 – Montreal River – Facing north showing alternate view of bay on river.

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Appendix D:

Curricula Vitae

Katie Easterling Hon. B.Sc., Dipl., EPt

Biologist

Katie Easterling is an Aquatic Ecologist with over 6 years of field experience in both the aquatic and terrestrial disciplines. Katie's experience includes fish habitat assessments, fish community sampling, fish salvages, REA water and water body assessments, trout spawning surveys, walleye spawning surveys, bass spawning surveys and baseline aquatic surveys for various pipeline, rail line, transportation, renewable energy and municipal projects. She also has experience conducting preliminary or baseline terrestrial habitat assessments and Species at Risk surveys. Katie's reporting skills include aquatic existing conditions reports, aquatic impact assessment reports, REA water assessment and water body reports, terrestrial existing conditions reports, Environmental Screening/Review Reports, Natural Heritage Evaluations (NHE) and Environmental Impact Statements (EIS). Katie has also consulted with First Nations, municipal, provincial and federal government agencies.

Katie is proficient in a variety of fish sampling techniques, including Fall Walleye Index Netting (FWIN), Near Shore Community Index Netting (NSCIN), fyke netting, seine netting, gill netting and boat and backpack electrofishing. She holds a certificate in radio telemetry and is certified in Ecological Land Classification (ELC). Her educational background focused on terrestrial, wildlife and aquatic biology, and includes a degree in Zoology and a Fish and Wildlife diploma. Prior to joining Stantec, Katie worked as an Ecological Research Assistant with Parks Canada, a Conservation Interpreter with the Long Point Region Conservation Authority and has worked as a Research Assistant and a Biologist.

EDUCATION

Hon. B.Sc., University of Toronto / Major Zoology, Minor Biology, Toronto, Ontario, 2003

Diploma, Sir Sandford Fleming College / Fish and Wildlife Technician, Lindsay, Ontario, 2007

Stantec Consulting Ltd. / Class II Electrofishing Crew Leader Certification Course, Guelph, Ontario, 2012

Certificate, ROM / Fish Identification Course, Toronto, Ontario, 2011

Ministry of Natural Resources / MTO/DFO/MNR Fisheries Protocol Training Session for Fisheries Specialists, Toronto, Ontario, 2011

MNR / Renewable Energy Natural Heritage Assessment Training, Toronto, Ontario, 2011

Ministry of Natural Resources / Wetland Classification Certificate, Elgin, Ontario, 2006

Ministry of Natural Resources / Ecological Land Classification Certification, Elgin, Ontario, 2006

REGISTRATIONS

Canadian Environmental Practitioner-In-Training, Canadian Environmental Certification Approvals Board

MEMBERSHIPS

Member, American Fisheries Society

PROJECT EXPERIENCE

Renewable Energy

Winter Bird Surveys, Ontario (Terrestrial Project Biologist)

As a requirement of O.Reg.116, avian monitoring surveys were conducted to characterize the bird community of two sites in Southern Ontario during the over-wintering period

Post-Construction Bird and Bat Mortality Monitoring, Ontario (Terrestrial Project Biologist)

Conducted post-construction bird and bat mortality monitoring, scavenger impact trials and searcher efficiency trials at the Ripley and Enbridge Ontario Wind Farms near Kincardine, Ontario as a requirement under O.Reg. 116

Katie Easterling Hon. B.Sc., Dipl., EPt

Biologist

Pre-Construction Bat Monitoring Surveys, Ontario (Terrestrial Project Biologist)
Under O.Reg. 116 AnaBat detectors were installed on MET towers and design/constructed/installed multiple ground AnaBat detector units at various wind farms in Southern Ontario. Monitored pre-construction bat activity and identified species using spectrogram analysis to report on the activity level surrounding the proposed wind farms

Fish Habitat Assessment, Ontario (Aquatic Ecologist)
As part of a wind farm Environmental Assessment under O.Reg. 116, a fish habitat assessment was conducted to determine the baseline conditions and watercourse sensitivity according to the DFO matrix at each of the proposed watercourse crossings

Amherst Island REA Water Body Assessment, Ontario (Aquatic Ecologist)
Conducted the REA water assessment and prepared the water body report for a renewable energy project on Amherst Island, which involved identifying and delineating water bodies and conducting fish community and fish habitat assessment at 39 locations across the Island

Napier Wind Project REA Water Body Assessment, Ontario (Aquatic Ecologist)
Conducted the REA water assessment and prepared the water body report for a renewable energy project, which involved fish habitat assessments at three locations across the Study Area

Adelaide REA Water Body Assessment, Ontario (Aquatic Ecologist)
Conducted the REA water assessment and prepared the water body report for a renewable energy project near Strathroy, which involved identifying and delineating water bodies and conducting fish community and fish habitat assessment at 41 locations

Cedar Point REA Water Body Assessment, Ontario (Aquatic Ecologist)
Conducted the REA water assessment and prepared the water body report for a renewable energy project near Forest, which involved identifying and delineating water bodies and conducting fish community and fish habitat assessment at over 100 locations

Hydroelectric Facilities, Lock 24 and 25 Dams on the Trent-Severn Waterway, Ontario (Aquatic Ecologist)
Conducted Walleye spawning surveys, benthic invertebrate sampling, small-bodied fish community sampling and Centrarchid spawning surveys at Locks 24 and 25 to establish baseline conditions within the proposed work area

Niagara Region Wind Corporation, Ontario (Aquatic Ecologist)
Conducted the REA water assessment for a renewable energy project near Welland, Ontario, which involved identifying and delineating water bodies at over 30 locations

Bow Lake Wind Project, Ontario (Aquatic Ecologist)
Conducted the REA water assessment for a renewable energy project near Sault Ste. Marie, Ontario, which involved identifying and delineating water bodies at over 20 locations

Municipal

Habitat Assessment, Regional Municipalities of Durham and York, Ontario (Terrestrial Project Biologist)
Multiple sites around the regions were assessed for wildlife usage, fisheries and ideal browse, nesting and cover habitat Recommendations for a preferred site were given based on a combination of these factors and how the potential loss of habitat through development would affect the local wildlife

Fish Sampling, Regional Municipality of Durham, Ontario (Aquatic Ecologist)
Various stations along Tooley Creek in Durham Region were electrofished to obtain composite samples of whole fish that were identified, weighed, measured and bagged for a metals analysis as part of a human health risk report for the proposed Durham-York Residual Waste Study

** denotes projects completed with other firms*

Katie Easterling Hon. B.Sc., Dipl., EPt

Biologist

Baseline Aquatic Survey, Regional Municipality of York, Ontario (Aquatic Ecologist)
A baseline terrestrial and aquatic survey was conducted as a project component of an Environmental Assessment for the Fairy Lake Garden Pond Maintenance Project in the Town of Newmarket. Tasks included a visual assessment of water depth, aquatic vegetation, available cover, substrate and the presence of barriers to fish movement upstream or downstream of Garden Pond, which were used to assess the feature's function as fish habitat, both within the pond and the pond's function within the Fairy Lake/East Holland River watershed

Aquatic Habitat Surveys, Town of Ajax, Ontario (Aquatic Ecologist)
The Town of Ajax is committed to improving water quality along its Lake Ontario waterfront and in Duffins Creek and Duffins Marsh. As part of this, preliminary fieldwork was conducted to assess the existing conditions at each of the stormwater outfalls, including terrestrial and aquatic habitat. The assessment consisted of a visual assessment of water depth, aquatic and terrestrial vegetation, available cover, substrate and the presence of barriers to fish movement upstream or downstream

Trout Spawning Surveys for Municipal Road Expansion, Ontario (Aquatic Ecologist)
Conducted multiple trout spawning surveys along two coldwater creeks in the eastern region of the GTA for two municipal road expansion projects. Fieldwork involved surveying the creeks 50 m upstream and 100 m downstream to determine if Rainbow Trout were staging or spawning in the creek and within the vicinity of the bridge

Arkell Well Field Adaptive Management Plan, City of Guelph, Ontario (Aquatic Ecologist)
As part of a yearly monitoring program, fish habitat was assessed using the OSAP protocol at four monitoring stations outside the city of Guelph

Natural Sciences & Heritage Resources

Forest and Wetland Classification, Parks Canada*, Ontario (Ecological Research Assistant)
Performed rapid assessments of 400 m forest plots and 100 m wetland plots to evaluate and classify sites along the Trent-Severn Waterway from Rice Lake to Canal Lake. Classification was based on biological features such as flora and fauna present and physiological features such as soil and drainage. Data collected was used to create a mapping inventory of the Trent-Severn system for Parks Canada and the Ministry of Natural Resources

Soil Sampling Survey, Brampton Brick, Brampton, Ontario (Terrestrial Project Biologist)
Collected soil samples to assess the impact of emissions on the surrounding terrestrial environment as part of the phytotoxicology assessment of the Brampton Brick facility

Ecological Receptors of Concern Surveys, Various Clients, Ontario (Terrestrial Project Biologist)
Conducted biological surveys of flora and fauna on potentially contaminated sites to assess the current site conditions

Category B Class EA, Ontario Realty Corporation, Various Locations, Ontario (Terrestrial Project Biologist)
Conducted the background research and evaluation of existing natural heritage baseline conditions for multiple ORC properties situated across Ontario

Preliminary Aquatic and Terrestrial Assessment, Canada Post, Various Locations, Ontario (Terrestrial Project Biologist)
Preliminary aquatic and terrestrial assessments of various sites in Southern Ontario were conducted to establish the existing baseline conditions. Surveys involved recording bird species observed, vegetation cover species found on the site and assessing potential impacts on nearby Valued Ecosystem Components (VECs) and any aquatic systems

Fish Community Survey*, Ontario (Fisheries Field Biologist)
FWIN, NSCIN, gill netting and Seine netting techniques were used to perform a fish surveys on a lake and rivers in the Kawartha Lakes system. Processing of the sampled fish included weighing, measuring, sexing, determining gonadal condition, removing aging structures and aging

** denotes projects completed with other firms*

Katie Easterling Hon. B.Sc., Dipl., EPt

Biologist

Benthic Invertebrate and Water Quality Sampling, Fox Meadows Estates, Ontario (Aquatic Ecologist)
Benthic invertebrate sampling was conducted following the OBBN protocol and water quality samples were collected and submitted for testing. Results from the sampling effort were summarized and compared to previous years in an effort to gage and mitigate potential impacts from a residential development expansion

Box Grove, DFO Authorization for Works Affecting Fish and Fish Habitat No. BU-04-3082, Ontario (Aquatic Ecologist)
This survey was conducted to satisfy conditions included in the Department of Fisheries and Oceans (DFO) Authorization for Works Affecting Fish and Fish Habitat (DFO Authorization No. BU-04-3082). Condition 4.2 of the Authorization is to enhance fish passage through the creation of a low flow channel following the removal of a 30 m long culvert. The culvert removal and new channel construction were completed in spring 2010. This survey was conducted as part of the post construction monitoring program required by the DFO Authorization

Piles Development (Keswick) Corporation, DFO Authorization PE 07-0957, Ontario (Aquatic Ecologist)
An evaluation of fish habitat, fish passage and the fish community was conducted within the channel realignment to confirm the compensation measures and structures are functioning as designed and are providing fish habitat. Fish community sampling was conducted using a backpack electrofisher

Lake Gibson Angler Survey, Ontario Power Generation, Thorold, Ontario (Aquatic Ecologist)
Lake Gibson is a hydro-electric reservoir owned and operated by Ontario Power Generation (OPG). As detailed in the OPG Risk Management Plan, OPG is required to monitor the persistence of sediment contamination and its expression in the environment within Lake Gibson. The program was designed to identify, quantify and compare the levels of contamination over time and the impact on sediments, water, benthic invertebrates, and fish in the system. Katie was involved as a field biologist interviewing anglers at Lake Gibson to assess the effectiveness of OPG's communication with the public regarding the contamination of Lake Gibson sediment and fishes

Phase 3 Environmental Effects Monitoring (EEM): Periodic Monitoring, Kirkland Lake, Ontario (Aquatic Ecologist)
The EEM program began in 2010 (continuing through 2012) and involved the collection of water, sediment, fish and benthos to assess possible environmental effects caused by the mine and followed federal Metal Mining Effluent Regulation (MMER) guidelines. Fyke nets and a boat electrofisher were used to capture target small-bodied species. Fish dissection, gender determination, weighing of livers and gonads, and collection of eggs were performed

Oil and Gas Pipelines

Baseline Aquatic Habitat Survey, TransCanada Pipelines Limited, Ontario (Aquatic Ecologist)
As part of an Environmental Assessment for the proposed Thorold Sales Meter Station to connect the TransCanada Mainline to the Enbridge Gas Distribution pipeline, baseline aquatic conditions were assessed as part of the report

Fish Salvage and Construction Monitoring, Enbridge Pipelines, Ontario (Aquatic Ecologist)
In-water construction work was monitored and fish salvages were conducted at various watercourses across Ontario as part of a pipeline maintenance or repair project. The fish collected were identified, measured and released downstream of the in-water work area

Baseline Aquatic Survey, Enbridge Gas Distribution Inc., Ontario (Aquatic Ecologist)
As part of the Pipeline to Serve York Energy Centre LP Environmental Assessment, aquatic baseline conditions at all watercourse crossings were summarized as part of the preliminary assessment of reasonable routing opportunities for the proposed pipeline

Detailed Fish Habitat Assessment and Reporting, TransCanada Pipelines Limited, Ontario (Aquatic Ecologist)
As part of a pipeline expansion project, a detailed fish habitat survey was conducted following MTO protocols at ten watercourse crossings. Methodology included detailed habitat mapping 50 m upstream and 100 m downstream. Fish habitat conditions were summarized and watercourse sensitivity determined according to the DFO matrix in the Fish and Fish Habitat Assessment Report as part of a CEAA Environmental Assessment

** denotes projects completed with other firms*

Katie Easterling Hon. B.Sc., Dipl., EPt

Biologist

Detailed Fish Habitat Assessment and Reporting, NOVA Chemicals (Canada) Ltd., Ontario (Aquatic Ecologist)
Fish habitat was assessed at nine proposed crossings for a pipeline route and existing conditions were summarized as part of an EA

Railroads

Fish Habitat Surveys and Reporting, Canadian Pacific Railway, Ontario (Aquatic Ecologist)
As part of a CEAA Environmental Screening Report, a fish habitat and aquatic baseline survey was conducted along a proposed rail siding within a wetland. The assessment consisted of a visual assessment of water depth, aquatic vegetation, available cover, substrate and the presence of barriers to fish movement within the area of the proposed siding

Detailed Fish Community and Habitat Surveys and Reporting, Canadian National Railway, Ontario (Aquatic Ecologist)
As part of a railway expansion project, detailed fish community and habitat surveys were conducted following MTO protocols at over 20 watercourse crossings. Methodology included detailed habitat mapping 50 m upstream and 100 m downstream, electrofishing to determine fish community present in the stream and water chemistry sampling. Fish community and habitat conditions were summarized and watercourse sensitivity determined according to the DFO matrix in the Fish and Fish Habitat Assessment Report as part of a CEAA Environmental Screening

Fish Salvage and Construction Monitoring, Canadian National Railway, Ontario (Aquatic Ecologist)
As part of a railway expansion project, in-water construction work was monitored and multiple fish salvages were performed at various bridge and culvert construction locations

Post-Construction Fish Community and Fish Habitat Assessment, Canadian National Railway, Ontario (Aquatic Ecologist)
As part of a railway expansion project, detailed post-construction fish community and habitat surveys were conducted following MTO protocols at approximately 20 watercourse crossings. Methodology included detailed habitat mapping 50 m upstream and 100 m downstream, electrofishing to determine fish community present in the stream and water chemistry sampling. The sites were assessed to confirm that potentially adverse effects on fish and fish habitat were effectively managed through mitigation measured proposed in the Environmental Screening Reports and approved in the Letters of Advice issued by DFO

Roads and Highways

Hwy 6 Fish Salvage, MTO Southwest Region, Ontario (Aquatic Ecologist)
Conducted a fish salvage as part of an MTO highway widening project located along Hwy 6 near Varney, Ontario. Fish collected were identified, measured and released downstream of the in-water work area

Detail Design, Highway 3, 6 and 24 Fish Community and Fish Habitat Assessment at Various Locations, MTO Southwest Region, Ontario (Aquatic Ecologist)
Conducted a detailed spring, summer and fall fish community and fish habitat assessment of 20 watercourse crossings for the rehabilitation/resurfacing of Highways 3, 6 and 24 surrounding the communities of Simcoe, Delhi and Port Dover (namely, GWP 3115-09-00, GWP 3048-03-00 and GWP 362 98 00). Reporting tasks included the Aquatic Existing Conditions Report and Impact Assessment Report for each highway

Route Planning, Hwy 17 Sudbury to Markstay (GWP 5031-09-00), MTO Northeast Region, Ontario (Aquatic Ecologist)
Prepared the Aquatic Existing Conditions Report as part of the preliminary route planning study for Highway 17 between Sudbury and Markstay

** denotes projects completed with other firms*

Katie Easterling Hon. B.Sc., Dipl., EPt

Biologist

Route Planning, Highway 144 Bypass around Chelmsford (GWP 5023-03-00), MTO Northeast Region, Ontario (Aquatic Ecologist)

Conducted fish habitat and fish community assessments at 63 locations in the area surrounding Hwy 144 near Chelmsford, Ontario. This involved using a backpack electrofisher or minnow traps (where applicable) to determine fish species and habitat present in order to assess the community structure and supplement watercourse sensitivity information provided by the MNR. Reporting tasks included the Aquatic Existing Conditions Report

Detail Design, Highway 7 Structural Culvert Replacement/Rehabilitation at Various Locations, MTO Eastern Region, Ontario (Aquatic Ecologist)

Conducted fish habitat and fish community assessments at 2 locations in the area surrounding Hwy 7 outside Lindsay Ontario (namely, WP 4007-08-01/02 Mariposa Creek Structural Culvert Rehabilitation, Site 32-124BC and Mariposa Brook Structural Culvert Replacement, Site 32-161C). This involved using a backpack electrofisher or minnow traps (where applicable) to determine fish species and habitat present in order to assess the community structure and supplement watercourse sensitivity information provided by the MNR. Reporting tasks included the Aquatic Existing Conditions Report

Detail Design, Highway 35 Structural Culvert Replacement/Rehabilitation at Various Sites, MTO Eastern Region, Ontario (Aquatic Ecologist)

Conducted fish habitat and fish community assessments at 3 locations in the area surrounding Hwy 35 outside Lindsay, Ontario (namely, WP 4166-09-01 Corben Creek Structural Culvert Replacement, Site 32-165C, WP 4165-09-01 Martin Creek Structural Culvert Rehabilitation, Site 32-063BC and WP 4075-09-01 South McLaren Creek Structural Culvert Rehabilitation, Site 32-072BC). This involved using a backpack electrofisher or minnow traps (where applicable) to determine fish species and habitat present in order to assess the community structure and supplement watercourse sensitivity information provided by the MNR. Reporting tasks included the Aquatic Existing Conditions Report

Detail Design, Highway 35, WP 102-99-01 Trent Canal Bridge Rehabilitation, Site 32-065 (Rosedale), MTO Eastern Region, Ontario (Aquatic Ecologist)

Prepared the Aquatic Existing Conditions Report as part of the Detailed Design process for the Highway 35 site at the Trent Severn Waterway Bridge Rehabilitation

Detail Design, Highway 6 & 10, GWP 3098-09-00 Rehabilitation, MTO Southwest Region, Ontario (Aquatic Ecologist)

Conducted fish habitat and fish community assessments at 11 locations in the along Highway 6/10 between Chatsworth and Owen Sound, Ontario. This involved using a backpack electrofisher or minnow traps (where applicable) to determine fish species and habitat present in order to assess the community structure and supplement watercourse sensitivity information provided by the MNR. Reporting tasks included the Aquatic Existing Conditions Report

** denotes projects completed with other firms*

Mark C. Pomeroy B.Sc.

Fisheries Biologist / Project Manager

Mark has 14 years of experience designing, coordinating, and implementing small and large scale aquatic habitat and impact assessments, encompassing numerous habitat types including lakes, ponds, large rivers, warmwater and coldwater streams. Mark has also developed and implemented many monitoring, mitigation, compensation and inventory processes. Past employment with Fisheries and Oceans Canada (DFO), and both the Grand River and St. Clair Region Conservation Authorities contributes to Mark's extensive working experience with regulatory and approvals processes related to the *Fisheries Act*, the *Conservation Authorities Act* and the *Drainage Act*. Mark's familiarity with *Fisheries Act* mitigation and compensation includes an understanding of the Habitat Alteration Assessment Tool (HAAT). He has extensive experience involving permitting and issues resolution related to the federal *Species at Risk Act* and the provincial *Endangered Species Act*. His experience also includes several transportation-related Environmental Assessments.

EDUCATION

Honours B.Sc. (Agriculture), University of Guelph / Natural Resources Management, Guelph, Ontario, 2000

Royal Ontario Museum / Freshwater Fish Identification Course, Toronto, Ontario, 2011

Class 1 Electrofishing Certificate / Ministry of Natural Resources, Waterloo, Ontario, 2010

Ontario Freshwater Mussel Identification Workshop / Fisheries and Oceans Canada - Canada Centre for Inland Waters, Burlington, Ontario, 2007

Fisheries Assessment Specialist and Fisheries Contracts Specialist, MTO/DFO/OMNR Fisheries Protocol Course, Downsview, Ontario, 2006

PROJECT EXPERIENCE

Renewable Energy

St. Columban Wind Project, Huron County, Ontario (Fisheries Biologist)

Planned, coordinated and conducted field investigations to assess potential aquatic impacts resulting from proposed wind project consisting of fifteen turbines. Drafted Water Assessment and Water Body Report as mandated under Ontario Reg. 359/09.

Plateau Wind Project, Grey County, Ontario (Fisheries Biologist)

Planned, coordinated and conducted field investigations to update previous field work to assess potential aquatic impacts resulting from proposed wind project consisting of eighteen turbines. Drafted relevant sections of the Environmental Screening Report (ESR) as mandated under Ontario Reg. 116/01. Provided advice concerning provincial species at risk concerns.

Grand Renewable Energy Park, Haldimand County, Ontario (Fisheries Biologist)

Planned, coordinated and conducted field investigations to assess potential aquatic impacts resulting from proposed wind and solar project consisting of sixty-seven turbines and 425,000 solar panels. Drafted Water Assessment and Water Body Report as mandated under Ontario Reg. 359/09.

Springwood Wind Project, Belwood, Ontario (Fisheries Biologist)

Conducted field investigations to assess potential aquatic impacts resulting from proposed wind project consisting of and assisted with draft Water Assessment and Water Body Report under Ontario Reg. 359/09.

Whittington Wind Project, Dufferin County, Ontario (Fisheries Biologist)

Planned and coordinated field investigations to assess potential aquatic impacts resulting from proposed wind project consisting of three turbines. Drafted Water Assessment and Water Body Report as mandated under Ontario Reg. 359/09.

** denotes projects completed with other firms*

Mark C. Pomeroy B.Sc.

Fisheries Biologist / Project Manager

Fairview Wind Project, Stayner, Ontario (Fisheries Biologist)
Planned and coordinated field investigations to assess potential aquatic impacts resulting from proposed wind project consisting of eight turbines. Drafted Water Assessment and Water Body Report as mandated under Ontario Reg. 359/09.

White Pines Wind Project, Prince Edward County, Ontario (Fisheries Biologist)
Planned, coordinated and conducted field investigations to assess potential aquatic impacts resulting from proposed wind project consisting of twenty-nine turbines. Drafted Water Assessment and Water Body Report as mandated under Ontario Reg. 359/09 (in progress).

Environmental Assessments

Pier 22 Wharf Completion, Hamilton Port Authority, Hamilton, Ontario (Aquatic Biologist)
Coordinated and exectued a fish community survey, underwater habitat assessment, and pond survey. Successfully developed and negotiated a Fisheries Compensation Plan with DFO for proposed works (i.e. a pond infilling) deemed by DFO to constitute harmful alteration, disruption or destruction of fish habitat. The plan included aquatic enhancement, mitigation measures and a post-construction monitoring program.

Locks 24 and 25 – VLH Turbine Installation, Canadian Projects Limited, Lakefield, Ontario (Aquatic Biologist)
Conducted aquatic assessments including walleye and bass spawning and habitat surveys in support of an Environmental Assessment (EA) for the installation of Very Low Head (VLH) turbines at Dams 24 and 25 on the Otonabee River. As part of the EA, will provide an analysis of impacts to walleye and bass spawning habitat and habitat use by small-bodied fish. The impact assessment will also be used as during the assessment of the project using the Fisheries & Oceans Canada (DFO) Risk Management Framework.

Pier 27 Dockwall Construction and Dredging, Hamilton Port Authority, Hamilton, Ontario (Aquatic Biologist)
Coordinated and conducted aquatic assessments, including a fish community survey and underwater habitat assessment in Hamilton Harbour, in support of the installation of a new dockwall and dredging to accommodate shipping traffic. Coordinated with DFO regarding need for Fisheries Act approval.

Pier 22 Infrastructure Development Environmental Assessment, Hamilton Port Authority, Hamilton, Ontario (Aquatic Biologist)
Coordinated and conducted aquatic assessments for an Environmental Assessment Screening under CEEA. Negotiated compensation measureswith DFO and drafted letter of intent in pursuit of Fisheries Act Authorization.

Bruce to Milton Transmission Line, Various, Ontario (Fisheries Biologist)
Planned, coordinated and assisted with execution of large-scale fisheries field program to assess potential impacts of proposed hydroelectric corridor reinforcement project and provided relevant input to the provincial environmental assessment process as well as the Fisheries Act and Conservation Authorities Act permitting processes. Managed data entry, analysis and completed reporting of aquatic resources sections. Coordination of multi-disciplinary team and regulatory agencies for acquisition of appropriate permits and approvals.

Yellow Falls Hydroelectric Project, Smooth Rock Falls, Ontario (Aquatic Biologist)
Planned, coordinated and assisted with execution of fisheries field program to assess potential impacts of proposed hydroelectric dam project. Facilitated acquisition of permits and approvals from relevant agencies. Assisted with fish, benthos, habitat, water and sediment sampling. Authored significant portions of the technical appendix related to aquatic study results.

Environmental Impact Assessments

Georgia Pacific Thorold Cycle 4 EEM, Thorold, Ontario (Aquatic Ecologist)
Assisted in field sampling of fish, benthos, water and sediment for federally regulated pulp and paper environmental effects monitoring.

** denotes projects completed with other firms*

Mark C. Pomeroy B.Sc.

Fisheries Biologist / Project Manager

Spruce Falls Cycle 4 EEM, Kapuskasing, Ontario (Aquatic Ecologist)
Assisted in field sampling of fish, benthos, water and sediment for federally regulated pulp and paper environmental effects monitoring.

Smooth Rock Falls Cycle 4 EEM, Smooth Rock Falls, Ontario (Aquatic Ecologist)
Assisted in field sampling of fish, benthos, water and sediment for federally regulated pulp and paper environmental effects monitoring.

Highway and Transportation

King Street and Fountain Street Improvements Class Environmental Assessment Study, Cambridge, Ontario (Fisheries Biologist)
Planned, coordinated and conducted field investigations to assess aquatic habitat at watercourse crossings within the project study area. Data collected during field investigations was used to assess potential impacts of preferred option. Drafted text for relevant sections of Class EA document.

Franklin Boulevard Widening Class Environmental Assessment Study, Cambridge, Ontario (Fisheries Biologist)
Planned, coordinated and conducted field investigations to assess aquatic habitat at watercourse crossings within the project study area. Data collected during field investigations was used to assess potential impacts of preferred option. Drafted text for relevant sections of Class EA document.

Highway 69 - Patrol Yards between Parry Sound and Sudbury, Ontario (Fisheries Biologist)
Planned, coordinated and conducted field investigations to assess aquatic habitat at watercourses within the project study area. Data collected during field investigations was used to assess potential impacts of proposed maintenance patrol yards located adjacent to Highway 69. Drafted text for inclusion in Fisheries and Aquatic Ecosystems Report. All work was conducted in accordance with the MTO/DFO/MNR Protocol (2006).

Highway 11 - High Falls Road Access Improvements Class Environmental Assessment, Bracebridge, Ontario (Fisheries Biologist)
Planned and conducted field investigations to assess aquatic habitat at watercourse crossings within the project study area. All work was conducted in accordance with the MTO/DFO/MNR Protocol (2006).

Highway 11 - Intersection Improvements, Powassan, Ontario (Fisheries Biologist)
Planned, coordinated and conducted field investigations to assess aquatic habitat at watercourse crossings within the project study area. Data collected during field investigations was used to assess potential impacts of preferred option, including potential impacts to Brook Trout. Drafted text for inclusion in Fisheries and Aquatic Ecosystems Report. All work was conducted in accordance with the MTO/DFO/MNR Protocol (2006).

Highway 3 - Rehabilitation between Jarvis and Renton, Ontario (Fisheries Biologist)
Planned, coordinated and conducted field investigations to assess aquatic habitat at watercourse crossings within the project study area. Data collected during field investigations was used to assess potential impacts of preferred option, including potential impacts to Brook Trout. Drafted Fisheries and Aquatic Ecosystems Report. All work was conducted in accordance with the MTO/DFO/MNR Protocol (2006), and included preparation and submission of "no HADD forms" to satisfy Fisheries Act requirements.

Highway 69 - Key River Bridge Replacement, Britt, Ontario (Fisheries Biologist)
Planned, coordinated and conducted field investigations to assess aquatic habitat in Key River at proposed location of bridge replacement. Data collected during field investigations was used to assess potential impacts of bridge replacement activities. Drafted Fisheries and Aquatic Ecosystems Report. All work was conducted in accordance with the MTO/DFO/MNR Protocol (2006), and included preparation and submission of "no HADD forms" to satisfy Fisheries Act requirements.

** denotes projects completed with other firms*

Mark C. Pomeroy B.Sc.

Fisheries Biologist / Project Manager

Replacement of Coutts Line Bridge over Baptiste Creek, Tilbury, Ontario (Fisheries Biologist)
Facilitated acquisition of provincial Endangered Species Act (ESA) approval (letter of advice) through provision of advice regarding construction techniques. Planned, coordinated and conducted field investigations to assess freshwater mussel community and habitat at bridge site.

Replacement of Dawn Mills Bridge over Sydenham River Creek, Dresden, Ontario (Fisheries Biologist)
Dawn Mills Bridge is located over a reach of the Sydenham River known to contain one of the largest number of taxa of federally regulated Species at Risk fish and mussels in Canada. Facilitated acquisition of federal approvals (Fisheries Act and Species at Risk Act, letter of advice) through provision of advice regarding construction techniques. Planned, coordinated and conducted field investigations to assess freshwater mussel habitat at bridge site.

Chinguacousy Road Widening, Brampton, Ontario (Fisheries Biologist)
Conducted fish community assessment to determine presence of Redside Dace (a provincially Endangered species). Drafted applications for Fisheries Act Authorization, Conservation Authorities Act approval, and Endangered Species Act approval. Provided input to engineering design for compensation measures related to Redside Dace habitat.

Detroit Windsor Truck Ferry Improvements (Design) (GWP 3071-06-00), Windsor, Ontario (Fisheries Biologist)
Provided aquatic community and habitat assessment services as well
as input regarding project design, construction staging and silt and sediment control planning. Acquired approvals under Fisheries Act and Conservation Authorities Act related to fish habitat. Negotiated compensation measures with Conservation Authority prior to project design change, resulting in no HADD.

Highway 24 - Intersection Improvements, Cambridge, Ontario (Fisheries Biologist)
Provided fish rescue services. Performed environmental inspection duties related to implementation of the Fisheries Act compensation plan and resolution of onsite issues related to construction.

Detroit Windsor Truck Ferry Improvements (Contract Administration) (WP 3071-06-00), Windsor, Ontario (Fisheries Biologist)
Construction monitoring services related to Fisheries Act implications (fish removals, species at risk identification training for contract staff , staging and implementation design review), provision of advice regarding alternative staging/construction operations to prevent impacts to aquatic habitat/organisms.

Fanshawe Park Road Widening, London, Ontario (Fisheries Biologist)
Facilitated acquisition of approvals from DFO for the realignment of Heard Drain/Snake creek during the expansion of Fanshawe Park Road. Performed construction inspection services, resolved onsite implementation issues related to the Fisheries Act.

Natural Resource Services

Municipal Drain Classification Program*, Various, Ontario (Drain Assessment Technician)
Planned and implemented large scale sampling protocol designed by DFO to assess the sensitivity of various municipal drains to disturbance. Sampling program encompassed all drains within the Grand River watershed and consisted of habitat, thermal and fish community characterization based on extensive field sampling. Analyzed substantial quantities of field data, summarized results and produced interim and final reports.

Fish Habitat Study*, Strathroy, Ontario (Biological Technician)
Planned and implemented field program to sample fish community in reservoirs managed by the St. Clair Region Conservation Authority. Responsible for writing final report concerning existing fish habitat status and providing recommendations based on field data. Participated in water quality and benthic community field sampling programs.

** denotes projects completed with other firms*

Mark C. Pomeroy B.Sc.

Fisheries Biologist / Project Manager

Various Environmental Assessments*, Sarnia, Ontario (Fish Habitat Biologist)

Assessed project proposals for impacts to fish habitat as defined in the Fisheries Act. Issued Letters of Advice and Authorization under the Fisheries Act. Carried out screening level environmental assessments of proposed projects under the Canadian Environmental Assessment Act. Participated in outreach programs and inter-agency work groups regarding Species at Risk recovery. Acquired familiarity with the Habitat Alteration Assessment Tool (HAAT).

Urban Land

Berczy Dam Removal, Markham, Ontario (Fisheries Biologist)

Provided fish rescue services, including resolution of issues related to Species at Risk.

Medway Sanitary Trunk Sewer Extension, London, Ontario (Fisheries Biologist)

Drafted Fisheries Act application and Endangered Species Act application for pipeline crossing of Medway Creek. Coordinated and completed aquatic habitat assessment and relocation of freshwater mussels. Negotiated compensation measures prior to project design change, resulting in no HADD.

Fox Hollow Subdivision, London, Ontario (Fisheries Biologist)

Facilitated acquisition of approvals from DFO for the realignment of the Heard Drain/Snake Creek and the installation of a stormwater management pond in relation to construction of the Fox Hollow Subdivision. Performed construction inspection services, resolved onsite implementation issues related to the Fisheries Act.

** denotes projects completed with other firms*

Mitch Ellah Tech. Dipl., B.Sc. (Hons.)

Aquatic Ecologist

Mitch Ellah is an aquatic ecologist in Stantec's Environmental Services group. He has significant experience conducting field research in the Canadian Arctic and various locations in southern and northern Ontario and Quebec. Mitch has been involved in all aspects of aquatic and terrestrial projects, including the review of background data, correspondence with government agencies, site investigation and data collection, and report writing. He is knowledgeable in, and proficient at field surveys and standardized protocols involving data collection for water quality and quantity, benthic macroinvertebrates, fish, bird, herpetofauna, aquatic plants and forest communities. Mitch has performed vegetation surveys using Ecological Land Classification (ELC) and Ontario Wetland Evaluation (OWES) protocols. He has excellent fish identification skills, and is proficient at conducting aquatic habitat and fish community assessments using electrofishing equipment, gill nets, fyke nets, seine nets and minnow traps. Mitch worked progressively for three field seasons in the Canadian Arctic investigating treatment wetlands in Nunavut and NWT Inuit communities. Mitch's knowledge of ecology and biotic identification, his strong communication skills and proven abilities at multi-discipline teamwork are complemented by his research experience, providing him with valuable technical expertise to meet a variety of project needs.

EDUCATION

B.Sc. (Honours), Trent University / Environmental Resource Science, Peterborough, Ontario, 2011

Tech. Dipl., Sir Sandford Fleming College / Environmental Technologist Diploma, Lindsay, Ontario, 2009

Tech. Dipl., Sir Sandford Fleming College / Environmental Technician Diploma, Lindsay, Ontario, 2008

Certificate, Ministry of Natural Resources / Ontario Wetland Evaluation System (OWES), Lindsay, Ontario, 2009

Certificate, Royal Ontario Museum / Fish Identification Workshop, Toronto, Ontario, 2011

Certificate, Stantec Consulting Ltd. / Class 2 Electrofishing Training, Guelph, Ontario, 2012

PROJECT EXPERIENCE

Renewable Energy

Niagara Region Wind Corp. Wind Farm, Niagara Region, Ontario (Field Ecologist)

Conducted aquatic assessments using REA water body designations, fish community presence/absence study and habitat characterization related to proposed wind farm

Bow Lake Wind Farm, Montreal River Harbour, Ontario (Field Ecologist)

Conducted fieldwork related to natural heritage terrestrial assessment that included locating bat maternity roosts, amphibian surveys, and habitat delineation. Aquatic fieldwork included habitat characterization and water body determination congruent with the Renewable Energy Act (REA) and fish community assessments

Cedar Point Wind Farm, Middlesex County, Ontario (Field Ecologist)

Conducted snake cover board searches to determine presence/absence of snake population and diversity

Capital Power (K2) Wind Farm, Goderich, Ontario (Field Ecologist)

Conducted aquatic assessments using REA water body designations, fish community presence/absence study and habitat characterization related to proposed wind farm

Mining

Victor Tango Extension Baseline Fishery and Fish Habitat Study, Attawapiskat, ON

Baseline study to document existing breeding bird communities in the vicinity of a proposed new diamond mine development. This study focused on the potential for species at risk to inhabit the study area.

** denotes projects completed with other firms*

Mitch Ellah Tech. Dipl., B.Sc. (Hons.)

Aquatic Ecologist

Victor Tango Extension Baseline Fishery and Fish Habitat Study, Attawapiskat, ON
Baseline mining study included fisheries, benthic, water, sediment and aquatic plant assessments, in a remote region of Northern Ontario. Study also included watershed delineation and bathymetric surveys. Mitch also conducted larval drift studies to document spawning activity in an unnamed creek and submitted samples for DNA analysis.

Natural Sciences & Heritage Resources

Hydro One Clarington Transformer Station, Clarington, Ontario (Field Ecologist)
Conducted fisheries and aquatic habitat assessment for proposed transformer station development

Shell Oil and Gas, Montreal, Quebec (Field Ecologist)
Conducted site investigation for amphibian and reptile populations, and amphibian breeding call surveys

Natural Heritage Site Inventories and Reporting*, Various Locations (Field Ecologist)
Bat maternity roost surveys in forest settings, various wildlife surveys including amphibians, reptiles, mammals, and birds; data collection and report writing for renewable energy REA environmental assessment projects; ELC vegetation community and wildlife habitat assessments; online database research for technical report preparation, including MNR Biodiversity Index and various atlases

Proposed Melancthon Quarry, Melancthon, Ontario (Field Ecologist)
Conducted species at risk surveys targeting Whip-poor-will using standardized MNR protocol

Proposed Simpson's Quarry EA, Bancroft, Ontario (Field Ecologist)
Conducted field sampling, including breeding bird, waterfowl breeding, and amphibian surveys, aquatic assessments, habitat characterizations, as well as species at risk surveys that included Blanding's Turtle and Whip-poor-will

Water

Komoka Wastewater Treatment Plant, Komoka, Ontario (Field Ecologist)
Conducted benthic macroinvertebrate and water quality sampling for wastewater treatment plant discharge

Fox Meadow Subdivision, Peterborough, Ontario (Field Ecologist)
Conducted benthic macroinvertebrates and water quality sampling for EEM of subdivision encroachment on PSW

Receiver Biomonitoring in Canagagigue Creek, Elmira, Ontario (Field Ecologist)
Water quality and quantity measuring, benthic macroinvertebrate, and fish community assessment at chemical plant discharge site

Blue Springs, Guelph, Ontario (Field Ecologist)
Routine flow measurement, monitoring and maintenance of rain gauges, Barologgers, air temperature loggers and in-stream water level loggers to assess potential effects of aggregate operations and groundwater draw down on fish habitat in a coldwater stream

Mill Creek Surface Water Monitoring Program, Guelph, Ontario (Field Ecologist)
Routine flow measurement, monitoring and maintenance of rain gauges, Barologgers, air temperature loggers and in-stream water level loggers to assess potential effects of aggregate operations and groundwater draw down on fish habitat in a coldwater stream

** denotes projects completed with other firms*

Nancy A. Harttrup B.Sc.

Fisheries Biologist / Project Manager

Nancy is a Fisheries Biologist and Project Manager with extensive experience collecting and analyzing data related to aquatic systems. Project experience includes aquatic impact assessments related to urban development, highway and pipeline construction, and aggregate extraction. Nancy has also managed environmental effects monitoring (EEM) programs for the mining and pulp and paper industries and has been involved in watershed studies, literature searches and analysis of benthic invertebrate and water quality data relative to environmental quality.

EDUCATION

B.Sc. (Honours), Co-op Biology, University of Waterloo, Waterloo, Ontario, 1986

PROJECT EXPERIENCE

Environmental Impact Assessments

Senior Review of Water Assessment and Water Body Reports in Support of Various Renewable Energy (Wind) Projects, Ontario (Aquatic Biologist / Senior Reviewer)

Provided Senior Review of the Water Assessment and Water Body reports for the following renewable energy projects:
- Cedar Point Wind Farm
- Adelaide Wind Farm
- Niagara Region Wind Project
- St. Columban Wind Project
- Bow Lake Wind Project
- David Brown Solar Project

Fish and Fish Habitat Surveys for MTO Preliminary Design Projects, Ontario (Fisheries ASsessment Specialist/Task Manager)

- Replacement of the Highway 11 Mattawishkwia River Bridge, Hearst
- Highway 11 Access Review South of Huntsville
- Highway 11 Access Review from Powassan to Callander
- Evaluation of Highway 11 Access and Interchange Improvements, near Allensville
- Highway 401 and Evaluation of Highways 401 and 8 Access and Interchange Improvements
- Highway 26 near Grey Road 40 (near Camperdown)

As a part of the Preliminary Design studies for the above projects, the projects required the collection of background data, detailed habitat mapping and the collection of fish community data as per the 2006 MTO/DFO/OMNR Fisheries Protocol for watercourses in each study area. Reporting requirements varied by project but typically included the preparation of an Existing Conditions Report and a Preliminary Impact Assessment Report. The Preliminary Impact Assessment Report included a summary of recommended mitigation measures and an assessment of impacts based on the Preferred Plan for the project.

Rehabilitation and Replacement of Four Structures on Highway 11 and Highway 17B near North Bay; MTO Northeastern Region, Ontario (Fisheries Assessment Specialist)

Fish community and fish habitat information was collected at three watercourse locations where structure replacement or rehabilitation was proposed. The assessment and reporting of fish and fish habitat at the sites followed the 2013 MTO/DFO/OMNR Fisheries Protocol. Reports included mitigation measures (design and construction) to protect fish habitat and an impact assessment of the proposed rehabilitation/replacement measures.

Highway 9 Holland Drainage Canal Bridge Replacement; MTO Central Region, Ontario (Fisheries Assessment Specialist)

A Comprehensive Fisheries Assessment was completed at the Holland Drainage Canal in the vicinity of the Highway 9 bridge. An Information Gathering Form was submitted to the MNR due to the possible presence of American Eel in the Holland Drainage Canal. The MNR determined that the proposed bridge would not adversely affect American Eel. Due to the bridge location, the project required coordination among two MNR districts. The project included an impact assessment the proposed new bridge and the assessment of activities required to re-enforce the bridge abutments and mid-water piers on a short-term basis prior to future bridge replacement.

** denotes projects completed with other firms*

Nancy A. Harttrup B.Sc.

Fisheries Biologist / Project Manager

Rehabilitation of Highway 6/10 from Chatsworth to Owen Sound (Detail Design); MTO West Region, Ontario (Fisheries Assessment Specialist)

Comprehensive Fisheries Assessments were completed at watercourse crossings potentially affected by the rehabilitation of Highway 6/10. Correspondence with the MNR confirmed habitat sensitivities and thermal regimes, based on results of the field program. The highway rehabilitation did not require work within 30 m of any of the identified watercourses, therefore submissions to DFO were not required.

Highway 24 Rehabilitation (Detail Design); MTO West Region, Cambridge, Ontario (Fisheries Assessment Specialist)

Fish habitat and fish community assessments were completed at watercourse crossings along Highway 24 south of Cambridge. Fish habitat was present at one coldwater stream, where a Comprehensive Fisheries Assessments was conducted. Input was provided to the culvert design, which required additional considerations due to existing culvert conditions and the presence of a recreational trail parallel to the highway. An Existing Conditions and Impact Assessment Report was prepared and a 'No HADD' form was submitted and approved by DFO.

Highways 3, 6, and 24 Rehabilitation (Detail Design); MTO West Region, Ontario (Fisheries Assessment Specialist)

Comprehensive Fisheries Assessments were conducted at all culvert sites providing fish habitat and Existing Conditions and Impact Assessment Reports were prepared. 'No HADD' forms were submitted to DFO and approved for all sites. The project included additional correspondence with DFO and the MNR regarding the potential presence of an aquatic species at risk in one watercourse.

Highway 7 and Highway 35 Structural Culvert Replacement/Rehabilitation at Various Locations, and Trent Canal Bridge Rehabilitation (Detail Design); MTO Eastern Region, Ontario (Fisheries Assessment Specialist)

Comprehensive Fisheries Assessments were conducted at five culvert locations in Eastern Ontario on Highway 7 and Highway 35 (Mariposa Creek, Mariposa Brook, Corben Creek, Martin Creek and South McLaren Creek). Existing Conditions and Impact Assessment Reports were prepared. 'No HADD' forms were submitted and approved sites. Bridge rehabilitation work at the Trent River on will follow DFO's Operational Statement for Bridge Maintenance.

Proposed Hydro Development at Locks 24 and 25 on the Trent-Severn Waterway, Ontario (Fisheries Biologist / Task Manager)

A work plan was developed and implemented for Walleye and Bass spawning and habitat surveys in support of an Environmental Assessment (EA) for the installation of Very Low Head (VLH) turbines at Dams 24 and 25 on the Otonabee River. The data collected will be used to assess impacts to fish habitat. The impact assessment will become part of the EA and will be used to work through Fisheries and Oceans Canada (DFO) Risk Management Framework to determine whether or not Fisheries Act Authorization is required for the project.

Amherst Island Wind Farm, Amherst Island, Ontario (Fisheries Biologist)

Prepared the Water Assessment Report and Water Body Report for the Amherst Island Wind Farm as per Ontario Reg. 359/09. The reports include information regarding the characteristics and locations of water bodies in the Zone of Investigation, potential aquatic impacts resulting from the project, recommended mitigation measures, and an assessment of overall effects on water bodies in the Zone of Investigation. The project includes a submarine cable crossing of Lake Ontario. The project includes DFO consultation (ongoing) to determine whether or not Fisheries Act authorization will be required for the cable landing areas.

** denotes projects completed with other firms*

Nancy A. Harttrup B.Sc.

Fisheries Biologist / Project Manager

Springwood Wind Project & Port Dover and Nanticoke Wind Project, Ontario (Fisheries Biologist)
Prepared the Water Assessment Report and Water Body Report for the Springwood Wind Project as per Ontario Reg. 359/09. The reports include information regarding the characteristics and locations of water bodies in the Zone of Investigation, potential aquatic impacts resulting from the project, recommended mitigation measures, and an assessment of overall effects on water bodies in the Zone of Investigation.

Fish and Fish Habitat Surveys, Rehabilitation of Highways 66 and 624, Larder Lake, Ontario (Fisheries Assessment Specialist / Task Manager)
As a part of a Detail Design study for the Rehabilitation of Highways 66 and 624 (District of Timiskaming) Nancy managed the field surveys and reporting for this project. Limited background data were available for the study area. Field data collection and reporting followed the 2006 MTO/DFO/OMNR Protocol and reporting included impact assessments for the numerous watercourses in the study area. Impact assessments were based the proposed work required at each culvert (e.g. rehabilitation, replacement) which subsequently lead to the completion of appropriate forms and submissions to DFO.

Galt Country Club Letter of Intent for DFO Authorization, Cambridge, Ontario (Biologist / Task Manager)
The redesign of a golf course fairway at the Galt Country Club resulted in changes to fish habitat in a golf course pond located in the floodplain and connected to the Grand River. Information regarding available data on fish species in the Grand River and detailed plans regarding changes to the pond were prepared as a Letter of Intent (LOI) and submitted to DFO for authorization of the project. The LOI included details of the existing and proposed pond areas and depths, illustrating that the new pond would provide and increase in available habitat. Habitat enhancements were added to the plan to provide structure cover.

Fish and Fish Habitat Surveys, Highway 40 Near Chatham, Ontario (Fisheries Assessment Specialist / Task Manager)
As a part of a Detail Design study for rehabilitation of Highway 40 south of Chatham, Nancy conducted field surveys and prepared an Impact Assessment Report for watercourses that cross Highway 40 between Highway 401 and the Thames River. The study involved the collection of background data, detailed habitat mapping and the collection of fish community data. Reporting included an assessment of aquatic habitat impacts, and mitigation measures to protect fish habitat in the watercourses during construction.

Fish Community Assessment and Habitat Inventory of Strasburg Creek near Doon Village Road, Kitchener, Ontario (Project Manager)
An aquatic habitat survey was conducted in Strasburg Creek, mapping physical features such as substrates, stream morphology, and instream and riparian cover. The data were required as part of the natural environment inventory for the future alignment of Doon Mills Road. Subsequent to the initial survey, fish community data were also collected in the area. During the construction phase, Nancy participated in the transfer of fish from the creek to the temporary diversion channel, prior to creek realignment for the new bridge.

Natural Sciences & Heritage Resources

Letter of Intent for DFO Authorization, Galt Country Club, Cambridge, Ontario

Letter of Intent for DFO, Ninth Line Tributary, TACC Construction Ltd., Markham, Ontario

Long-term Monitoring and Reporting of Brown Trout Spawning Activity, Populations and Surface Water Quality in a Coldwater Stream Adjacent to an Active Gravel Pit (1993 to2003) - Dufferin Aggregates (Project Manager)

Fish habitat study for Kempenfelt Bay, Lake Simcoe, City of Barrie (Aquatic Biologist / Project Manager)

Aquatic Resources Survey in Two Small Lakes in Georgian Bay Islands National Park (Aquatic Biologist / Project Manager)

** denotes projects completed with other firms*

Nancy A. Harttrup B.Sc.

Fisheries Biologist / Project Manager

Aquatic Habitat Mapping in Fathom Five National Marine Park (Aquatic Biologist / Project Manager)

Numerous Aquatic Habitat Impact Assessments Related to Residential Development, Pipeline Construction, Road Construction and Alterations (Aquatic Biologist)

Aquatic Ecology

Oxbow Lake Investigation at the New Hamburg Wastewater Treatment Plant, New Hamburg, Ontario (Aquatic Biologist)

Background fisheries data were collected and reviewed for a tributary of the Nith River originating in an abandoned oxbow of the Nith River. Bi-weekly collection of surface water samples were collected along the oxbow feature to determine if the existing oxbow provides additional treatment or can be modified to augment treatment.

Assessment of the Benthic Invertebrate Community in the Saugeen River adjacent to the Hanover Landfill Site, Town of Hanover (Aquatic Biologist)

A biological monitoring program was developed to compare benthic invertebrate community health in the Saugeen River upstream and downstream of the Hanover Landfill. The three-year program involves the collection of benthic invertebrate samples from the river using artificial substrates left in place for approximately six weeks. Results were used as an indicator of aquatic habitat quality adjacent to the landfill relative to upstream and downstream areas.

Assessment of Wetland Pond Health and Downstream Water Quality at Chinguacousy Landfill (Aquatic Biologist)

Benthic invertebrates were collected from a wetland pond at the Chinguacousy Landfill site to determine if the pond life was affected by landfill leachate. The survey included the collection of water chemistry data from the pond, the outflow stream, and nearby reference locations. Baseline data collection for the project included toxicity testing to determine if the site runoff was toxic to aquatic organisms.

Mill Creek Surface Water Monitoring Program, Guelph, Ontario (Project Manager, Fisheries Biologist)

To assess potential impacts on Mill Creek (a tributary to the Grand River), a long-term Surface Water Monitoring Program (SWMP) was initiated to monitor water quality, Brown Trout (Salmo trutta) populations, water levels and stream temperatures over time. During her 10-years involvement with the project, Nancy's duties included project management, the coordination of annual spawning surveys, population surveys and water quality sampling. Annual reports included the compilation of annual fisheries data and the integration of fisheries data with groundwater and surface water data into a comprehensive monitoring report.

Brant Mill Pond Fisheries Impact Assessment, Brant County, Ontario (Biologist / Task Manager)

A bridge replacement was required on a road crossing the outlet of Brand Mill Pond. The mill pond dam was structurally tied to the bridge, therefore a method was needed to reduce water pressure on the dam prior to bridge removal and replacement. Various construction scenarios were considered, including draining or partially draining the mill pond. A bathymetric survey of a mill pond was conducted to provide an indicator of available fish habitat in the pond (by depth) and the predominant substrate types. A document summarizing fish habitat conditions in the pond and possible impacts to fish habitat based on the selected construction method was submitted to GRCA for review.

Wilmot Centre Trout Spawning Surveys, Waterloo (Wilmot Centre), Ontario (Project Manager)

Annual Brook Trout spawning surveys have been completed in a small coldwater creek in Wilmot Centre in the vicinity of groundwater wells that provide drinking water to the supply Regional Municipality of Waterloo. The program is part of the Wilmot Centre monitoring program and looks at annual Brook Trout spawning activity in the creek as an indicator of the quantity and quality of suitable habitat. Brook Trout depend on areas of groundwater upwelling for spawning purposes therefore the health of the fishery is related to groundwater levels in the area.

** denotes projects completed with other firms*

Nancy A. Harttrup B.Sc.

Fisheries Biologist / Project Manager

Benthic Invertebrate Community Survey in the Maitland River at Wingham, Wingham, Ontario (Project Manager)

Nancy was the Project Manager for an ongoing benthic invertebrate survey in the Maitland River in Wingham, Ontario. The monitoring was an annual program that involved the collection of benthic invertebrate samples from the river as an indicator of the quality of aquatic habitat in the river adjacent to a closed landfill site. Nancy was responsible for Project Management of the survey, the coordination of data collection, data analysis and reporting.

Receiver Biomonitoring in Canagagigue Creek, Elmira, Ontario (Project Manager)

Nancy was the Project Manager for a long-term Biomonitoring Program in Canagagigue Creek in Elmira, ON. The monitoring is now a biannual program that sees the collection of benthic invertebrate, sediment and fish community data in the creek. The program is a condition of the C of A for discharge of treated groundwater to the creek. Nancy was responsible for Project Management of the survey, the coordination of data collection, data analysis and reporting.

Letter of Intent for DFO Authorization, Strasburg Creek at Strasburg Road Extension, Kitchener, Ontario (Biologist / Task Manager)

The extension of Strasburg Road in the City of Kitchener required a new crossing of Strasburg Creek, which provides coldwater fish habitat. Data collection consisted of a habitat inventory, fish community survey, summer water temperatures (hourly data by instream loggers) and a fall spawning survey. All fisheries and fish habitat data were summarized and used in the Letter of Intent (LOI) submitted to DFO for authorization of the project. The LOI included mitigation and compensation measures for the loss of fish habitat that resulted from the installation of the 40m long culvert.

Letter of Intent for DFO Authorization, Tributary of Baden Creek, Baden, Ontario (Biologist / Task Manager)

A stormwater management pond outfall in a new subdivision in the town of Baden resulted in the loss of fish habitat in a small tributary of Baden Creek. Together with available background data on the main channel of Baden Creek, fish habitat data were summarized and used in the Letter of Intent (LOI) submitted to DFO for authorization of the project. The LOI included mitigation and compensation measures for the loss of fish habitat that resulted from the SWM outfall.

Assessment of Impacts of Seepage from Caledon Landfill on Fisheries of the Credit River, Region of Peel (Aquatic Biologist)

Benthic invertebrates were collected from a perched fen downgradient of the Caledon Landfill site. The qualitative survey collected organisms to determine species presence/absence in the fen. The survey included the collection of water samples for chemical analysis and toxicity testing. Nancy was involved in earlier project work for the Caledon Landfill, collecting benthic invertebrates from the Credit River adjacent to the landfill site.

Wastewater

Wastewater Treatment Plant Biomonitoring, Woodstock, Ontario (Senior Biologist / Project Manager)

A Benthic macro-invertebrate sampling program and a multi week in-situ water quality monitoring program were designed and completed. The program was designed to identify the potential impacts of the municipal wastewater treatment plant discharge on the biota and water quality of the Thames River.

Middle-Grand River Assimilative Capacity Assessment, Kitchener, Ontario (Aquatic Biologist)

Collection, review and summary of background data with respect to downstream users; assessment of effluent and outflow structure changes to aquatic habitat. Peer review of Grand River Surface Water Quality Monitoring Report.

Cycle 1 Environmental Effects Monitoring: project management, field studies and data analysis, Domtar Packaging, Norampac Inc., Red Rock, Ontario (Aquatic Biologist / Project Manager)

** denotes projects completed with other firms*

Nancy A. Harttrup B.Sc.

Fisheries Biologist / Project Manager

Cycle 1 Environmental Effects Monitoring: Project Management, Field Studies and Data Analysis, Domtar Packaging, Trenton, Ontario (Aquatic Biologist)

Cycle 1, 2 and 3 Environmental Effects Monitoring: Project Management, Field Studies and Data Analysis, Domtar Fine Papers, Cornwall, Ontario (Aquatic Biologist)

Cycle 2 and 3 Environmental Effects Monitoring: Project Management and Data Analysis, Provincial Papers Inc., Cascades Fine Papers Group, Thunder Bay, Ontario (Project Manager)

** denotes projects completed with other firms*