Appendix B:

Addendum: Natural Heritage Assessment & Environmental Impact Study

Bow Lake Wind Farm Natural Heritage Assessment and Environmental Impact Study – Modification Document

Fibre Optic Line: Natural Heritage Assessment and Environmental Impact Study

File No. 160960771

Prepared for:
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January 27, 2014

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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 Natural Heritage Assessment/Environmental Impact Study (NHA/EIS, Stantec, 2013a) was completed for the Bow Lake Wind Farm and confirmed by the Ministry of Natural Resources (MNR) on January 25, 2013. This report is submitted as a Modification Document to the NHA/EIS (Stantec, 2013a). Information previously presented in the NHA/EIS (Stantec, 2013a) has been carried forward into this Modification Document.

Subsequent to the REA Application submission, the need was identified to install a fibre optic line from the Project's transformer station to Highway 17 to facilitate communication to and from the wind 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. Some sections of these roadbeds were included as part of the Project Location in the NHA/EIS (Stantec, 2013a) submission and some sections were not. Therefore, the Project Location has been revised to include the new sections of roadbeds that will be utilized for the installation of the fibre optic line. Only the portions of the revised Project Location associated with the fibre optic line are addressed in this Modification Document.

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 also connect to Great Lakes Power's Gartshore Transformer Station (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. The revised Project Location showing the fibre optic line is illustrated on **Figure 1.0, Appendix A**.

The Proponent has retained Stantec Consulting Ltd. (Stantec) to prepare this Modification Document to the REA Application, as required under Ontario Regulation 359/09 - Renewable Energy Approvals under Part V.0.1 of the Act 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 Project: the Bow Lake Wind Farm's nameplate capacity remains at 58.32 MW and the remainder of the Project Location (including turbines, collector lines, pad-mounted transformers, crane pads, two permanent meteorological (met) towers, access roads, an operations and maintenance building, welfare buildings, a Transformer Station (TS), construction compounds and laydown yards, and other ancillary facilities), all remain as shown and assessed in the NHA/EIS (Stantec, 2013a) and the REA Application.

This Modification Document is provided to identify and assess potential impacts on any natural features from the installation and operation of the fibre optic line. In keeping with the format of an NHA/EIS (Stantec, 2013a), this Modification Document provides a records review, site investigation, and evaluation of significance of natural features, and identifies potential effects and mitigation measures. Features which were previously evaluated in the NHA/EIS (Stantec, 2013a) are included in this Modification Document where they are within 120m of the fibre optic line. Features that are not within 120m of the fibre optic line are addressed in the NHA/EIS (Stantec, 2013a).

The additional information provided herein does not alter in any way the findings or conclusions presented in the NHA/EIS (Stantec, 2013a) or any other documents submitted in the REA Application.

1.2 PROJECT LOCATION

The revised Project Location includes sections of road bed 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 Transformer Station. As noted, sections of these roadbeds were previously assessed as part of the access road upgrade component of the Project in the NHA/EIS (Stantec, 2013a). This Modification Document focuses on the un-assessed sections of roadbed.

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.

Given that the fibre optic line will be installed in road beds (either existing or confirmed by the MNR as part of the 2013 NHA/EIS review), there are no natural features in the revised Project Location. This Modification Document addresses natural heritage features that are within 120 m of the fibre optic line.

The revised Project Location, the 120 m Zone of Investigation (ZOI), and areas previously assessed as part of the NHA/EIS (Stantec, 2013a) are shown on **Figure 1.0, Appendix A**. The revised Project Location is confined within the Bow Lake Wind Farm Study Area, as defined in Section 1.2 of the NHA/EIS (Stantec, 2013a) and shown on **Figure 1.0, Appendix A**.

1.3 REPORT REQUIREMENTS

This Modification Document is intended to satisfy the requirements outlined within O. Reg. 359/09 (s. 24 through 28, 37 and 38) for the proposed Bow Lake Wind Farm modification.

During the preparation of this Modification Document, several guidance documents were referenced to ensure compliance with current standards and agency requirements. The Natural Heritage Assessment Guide for Renewable Energy Projects (MNR, 2012a), or NHA Guide, released by MNR in November 2012 for wind power projects under the REA Regulation is the primary guidance document used to prepare this Modification Document. Other guidance documents include:

- Bats and Bat Habitats Guidelines for Wind Power Projects (MNR, 2011a);
- Birds and Bird Habitats Guidelines for Wind Power Projects (MNR, 2011b);
- Significant Wildlife Habitat Technical Guide (SWHTG) and Appendices (MNR, 2000a);
- Significant Wildlife Habitat Decision Support System (SWHDSS)(MNR, 2000b);
- Ontario Wetland Evaluation System, Northern Manual (MNR, 1993, updated 2002);
- Draft Significant Wildlife Habitat EcoRegion 5E Criterion Schedule (Eco-Region Criteria) (MNR, 2012b); and,
- Technical Guide to Renewable Energy Approvals (MOE, 2011).

A Natural Heritage Assessment is required to determine whether any of the following features exist in and/or within 120 m of the Project Location:

- Wetlands;
- Coastal wetlands;
- Life Science Areas of Natural and Scientific Interest (ANSIs);
- Earth Science ANSIs;
- Woodlands;
- Wildlife habitat; and
- Provincial parks and conservation reserves.

Introduction
January 27, 2014

This Modification Document identifies the presence and boundaries of all natural features within 120 m of the fibre optic line based on a review of background records and on-site field investigations. This Modification Document provides an Evaluation of Significance for each identified feature based on either an existing MNR designation of the feature, or by using evaluation criteria and procedures established or accepted by the MNR.

For the identified significant features that occur within 120 m of the fibre optic line, an Environmental Impact Study has been completed to identify and assess any negative environmental effects and to recommend mitigation measures (O.Reg. 359/09, s.38).

2.0 Records Review

This records review report was prepared in accordance with O. Reg. 359/09, s. 25 (3).

Background data were collected and reviewed to identify natural heritage features within 120m of the fibre optic line. This review was conducted as part of the NHA/EIS (Stantec, 2013a), which was confirmed by the MNR on January 25, 2013. Documents reviewed and agencies contacted as part of the records review are identified in Section 2.1 of the NHA/EIS (Stantec, 2013a).

A summary of agencies contacted, information requested and responses received is provided in Table 1, Appendix B of the NHA/EIS (Stantec, 2013a).

The information received from each source and the manner in which it was used to identify natural heritage features, provincial parks or conservation reserves that exist within 120 m of the fibre optic line (50 m for Earth Science ANSIs) are presented below.

2.1 WETLANDS

A review of MNR's Land Information Office (LIO) mapping, and the Natural Heritage Information Centre (NHIC) database has indicated the presence of one wetland within 120 m of the fibre optic line.

Provincially Significant Wetlands: Provincially significant wetlands (PSW) are those that have been identified by MNR using procedures established in the Ontario Wetland Evaluation System (OWES) (MNR, 2002). No provincially significant wetland is located within 120 m of the fibre optic line.

Non-provincially Significant Wetlands: Non-provincially significant wetlands are those that have been evaluated but did not receive sufficient points to be considered provincially significant. No evaluated, non-provincially significant wetland is located within 120 m of the fibre optic line.

Unevaluated Wetlands: Wetlands that have yet to be examined are termed unevaluated. MNR database mapping indicated that one unevaluated wetland is located within 120 m of the fibre optic line.

Twelve previously unidentified wetlands were identified within 120 m of the fibre optic line by Stantec during fieldwork conducted for the NHA/EIS (Stantec, 2013a).

Wetlands within 120 m of the fibre optic line, as identified through the records review and fieldwork conducted for the NHA/EIS (Stantec, 2013a), are shown on **Figures 2.1-2.4, Appendix A.**

2.2 WOODLANDS AND VALLEYLANDS

The Bow Lake Wind Farm is located on the Canadian Shield. As per Section 5.6 of the 'Natural Heritage Assessment Guide for Renewable Energy Projects' (MNR, 2012a), proponents engaging in a renewable energy project are not required to identify the presence and boundaries of woodlands which occur in or within 120 m of the Project Location in areas on the Canadian Shield. The identification and delineation of valleylands are not required as part of the NHA process.

2.3 AREAS OF NATURAL AND SCIENTIFIC INTEREST (ANSI)

MNR identifies two types of ANSIs: Life Science and Earth Science (MNR, 2012a). Life Science ANSIs are significant representative areas of Ontario's biodiversity and natural landscapes, while Earth Science ANSIs are geological in nature and consist of some of the more significant representative examples of the bedrock, fossils and landforms in Ontario.

No ANSI's are located within 120 m of the fibre optic line.

2.4 SIGNIFICANT WILDLIFE HABITAT

Significant wildlife habitat is defined as an area where plants, animals and other organisms live, including areas where species concentrate at a vulnerable point in their life cycle and that are important to migratory and non-migratory species (MNR, 2012a). MNR provides tools to identify and evaluate wildlife habitats for significance. Significant wildlife habitat (SWH) can be grouped into four categories:

- Seasonal concentration areas of animals;
- Rare vegetation communities or specialized habitat for wildlife;
- Habitat for species of conservation concern; and
- Animal movement corridors.

All wildlife habitats that are known to, or have the potential to, extend into the Bow Lake Wind Farm Study Area (including the revised Project Location) were identified and are described in Table 2.1, Appendix B, of the NHA/EIS (Stantec, 2013a). For this Modification Document, as the fibre optic line is restricted to the existing and upgraded road beds of Dump Road, Hogg Dam Road and MacKay Road, no wildlife habitat occurs within the revised Project Location. In some instances the designated radius around a wildlife habitat feature may overlap with the existing roadway, however the road itself is not considered to be part of the wildlife habitat. Based on the records review, and the findings of the NHA/EIS (Stantec, 2013a), the following wildlife habitat types have the potential to occur within 120 m of the fibre optic line:

2.4.1 Seasonal Concentration Areas of Animals

- Bat maternity colonies
- Turtle wintering areas
- Reptile hibernacula (snakes)

2.4.2 Rare Vegetation Communities or Specialized Habitat for Wildlife

- Cliffs and talus slopes
- Waterfowl nesting areas
- Woodland raptor nesting habitat
- Seeps and springs
- Amphibian breeding habitat (woodland)

2.4.3 Habitat for Species of Conservation Concern

- Marsh breeding bird habitat
- Canada Warbler habitat
- Olive-sided Flycatcher habitat
- Oval-leaved bilberry habitat
- Boreal bedstraw habitat
- Braun's holly fern habitat

Other potential wildlife habitat types that could occur within the Bow Lake Wind Farm Study Area, such as animal movement corridors and habitats for rare plant species (i.e., Woodland Pine Drop, Wooly Beach Heath, Mountain Fir-moss, Blue Wild Rye and Quill-spike Rush), were assessed in the NHA/EIS (Stantec, 2013a) and have been confirmed as absent.

2.5 PROVINCIAL PARKS AND CONSERVATION RESERVES

Records review confirmed that an addition (P292) to Lake Superior Provincial Park (LSPP) is located within 120 m of the fibre optic line. P292 is located west of Highway 17, and across the highway from the entrance to Dump Road.

2.6 NATURAL FEATURES IN SPECIFIED PROVINCIAL PLAN AREAS

The revised Project Location is not within the Niagara Escarpment Plan Area, the Oak Ridges Moraine Conservation Plan Area or the Protected Countryside of the Greenbelt Plan.

2.7 SUMMARY

Based upon records review, including the findings of the NHA/EIS (Stantec, 2013a), the following natural features occur within 120 m of the fibre optic line:

- Wetlands: Thirteen unevaluated wetlands
- Wildlife Habitat, including:
  - Seasonal Concentration Areas of Animals
    - Bat maternity colonies
    - Turtle wintering areas
    - Reptile hibernacula (snakes)
  - Rare Vegetation Communities or Specialized Habitat for Wildlife
    - Cliffs and talus slopes
    - Waterfowl nesting areas
    - Woodland raptor nesting habitat
    - Seeps and springs
    - Amphibian breeding habitat (woodland)
  - Habitat for Species of Conservation Concern
    - Marsh breeding bird habitat
    - Canada Warbler habitat
    - Olive-sided Flycatcher habitat
    - Oval-leaved bilberry habitat
    - Boreal bedstraw habitat
    - Braun's holly fern habitat
- Provincial Parks and Conservation Reserves: Lake Superior Provincial Park addition P292.

Site investigations were conducted to confirm the presence and boundaries of natural features, as well as to determine whether any additional natural features exist within 120 m of the fibre optic line.

3.0 Site Investigation

Site investigations in support of this Modification Document were completed with the purpose of identifying any additional natural features within 120 m of the fibre optic line that were not assessed as part of the NHA/EIS (Stantec, 2013a). Data collected during the records review regarding natural features and species occurrences were used to guide the scope and direction of site investigations. Where appropriate, the findings of the NHA/EIS (Stantec, 2013a) have been incorporated into this Site Investigation.

The bulk of the site investigations were conducted as part of the NHA/EIS (Stantec, 2013a). Details on field surveys, including dates, times, duration, weather conditions and field personnel qualifications are presented in Table 4, Appendix B and Appendix G of the NHA/EIS (Stantec, 2013a). Additional surveys performed in 2013 for the purpose of identifying and evaluating any additional natural features are described in this Modification Document. Access was available for all lands where Project components are proposed, and all areas within 120 m of the Project Location were traversed on foot during site investigations.

All site investigations were carried out in accordance with O. Reg. 359/09, the 'Technical Guide to Renewable Energy Approvals' (MOE, 2011), and the 'Natural Heritage Assessment Guide for Renewable Energy Projects' (MNR, 2012a), using guidance provided in the SWHTG and the 'Draft SWH EcoRegion 5E Criterion Schedule' (MNR, 2012b).

3.1 METHODS

Vegetation Communities and Vascular Plants

Vegetation community classification and botanical inventories for communities within 120 m of the fibre optic line were conducted on July 18-22, 2012 and July 29-August 3, 2012, as part of the NHA/EIS (Stantec, 2013a). Vegetation communities were delineated on aerial photographs and checked in the field. Community characterizations were then based on the Ecosites of Ontario (Banton et al., 2009) system, an amalgamation of all Ontario ecosystem classification guides, and have been identified to the Vegetation Type unit level (Lee et al., 1998). English colloquial names and scientific binominals of plant species generally follow Newmaster et al. (1998). Specific emphasis was placed on searching for plant species of conservation concern and species at risk identified through the records review, as the presence of such plants would determine locations of Significant Wildlife Habitat (SWH). Plant species were considered species of conservation concern and/or species at risk if designated provincially as S1 (critically imperiled), S2 (imperiled), S3 (vulnerable) or SH (Possibly Extirpated - Historical).

More detail on the methods used for the vegetation community classification and vascular plant inventories can be found in Section 3.2.1 of the NHA/EIS (Stantec, 2013a).

Wetlands

Previously unidentified wetlands within 120 m of the fibre optic line identified during the course of the site investigations were delineated during the vegetation community assessment and vascular plant surveys on June 18-22, 2012 and July 29-August 3, 2012, as reported in the NHA/EIS (Stantec, 2013a). Additional wetland assessments were conducted in July 2013 for six previously unevaluated wetlands which were not within 120 m of the original Project Location, but were within 120 m of the fibre optic line. Wetland boundaries were mapped according to the OWES Northern Manual, through reconciling aerial photographs and observations made during the site investigations (including delineation with GPS units). In keeping with the OWES Northern Manual, the outer boundaries of wetlands were established where 50% of the vegetation cover consists of upland plants.

Wildlife Habitat

Surveys to determine the presence of habitat features that would support seasonal concentrations of animals, rare vegetation communities, or specialized habitat for wildlife as outlined in the Draft Significant Wildlife Habitat (SWH) Ecoregion 5E Criteria Schedule (MNR, 2012c) were conducted as described in Section 3.1.4 of the NHA/EIS (Stantec, 2013a) and are summarized in **Table 3.1, Appendix B** of this Modification Document. Additional fieldwork was undertaken by Stantec on May 5-12, May 26-June 1, June 19-15, and July 7-16, 2013, to conduct habitat use surveys as per the commitments in Section 5.6 of the NHA/EIS (Stantec, 2013a) and Section 2.0 of the Environmental Effects Monitoring Plan for Wildlife (Stantec, 2013b). During these periods, additional efforts were made to identify and delineate previously unidentified Candidate SWH within 120 m of the fibre optic line.

Information on ecosites and habitat features present within 120 m of the fibre optic line gathered from ELC and Wildlife Habitat Assessment surveys were compared to the definitions of Candidate SWH provided in the Draft SWH Ecoregion 5E Criteria Schedule (MNR, 2012c) to determine the presence of Candidate SWH components found within 120 m of the fibre optic line. Appendix D of the Natural Heritage Assessment Guide (MNR, 2012a) was used to determine which Candidate SWH must be individually identified and delineated within 120 m of an underground line. For underground lines, all features within 120 m which do not overlap with project infrastructure can be considered Generalized Candidate SWH (Generalized). These habitats are carried forward to the Environmental Impact Study where they are treated as significant and general construction mitigation is applied. As the fibre optic line is restricted to the road beds of Dump Road, Hogg Dam Road and MacKay Road, no wildlife habitat overlaps with the underground line. In some instances the designated radius around a wildlife habitat feature may overlap with the existing roadway, however the road itself is not considered to be part of the wildlife habitat.

Only those wildlife habitats where the radius around the feature directly borders project components (i.e., the underground fibre optic line) have been individually identified and delineated. The remaining candidate habitats within 120 m of the fibre optic line have been Generalized.

3.2 RESULTS

The Bow Lake Wind Farm Study Area is composed primarily of natural vegetation including deciduous forest, coniferous forest, swamp, marsh and other wetland communities. Vegetation communities are described in Section 3.2.1 of the NHA/EIS (Stantec, 2013a).

Field notes for the site investigations conducted by Stantec and MKI in 2012 are provided in Appendix E and Appendix F, respectively, in the NHA/EIS (Stantec, 2013a).

A summary of all natural features within 120 m of the Project Location for the Bow Lake Wind Farm, including descriptions of the features' attributes, compositions and functions, is provided in Table 6, Appendix B of the NHA/EIS (Stantec, 2013a). Additional features identified within 120 m of the fibre optic line are described in **Table 3.1, Appendix B** of this Modification Document.

Vegetation Communities and Vascular Plants

The forested communities within the Bow Lake Wind Farm Study Area and surrounding landscape represent several different vegetation types but one contiguous forested area. Where it is ecologically appropriate functions are assessed on the basis of ELC Ecosites, however for some ecological functions the most appropriate scale of analysis is the large continuous forested area.

ELC/FEC communities within 120 m of the fibre optic line are shown on **Figures 2.1-2.4, Appendix A**. Descriptions of the vegetation communities found within 120 m of the Project Location and a complete list of vascular plant species recorded are provided in Appendix C of the NHA/EIS.

Wetlands

Seven (7) wetlands within 120 m of the fibre optic line were assessed during site investigations in 2012. These wetlands consisted primarily of Organic Rich Conifer swamps (ELC/FEC code G129Tt) with scattered small meadow marshes and swamp thickets, and were evaluated for significance as part of the NHA/EIS (Stantec, 2013a). One of these seven wetlands (SWET-42) was evaluated in 2012 but was not reported in the NHA/EIS (Stantec, 2013a) as it was located outside of the ZOI. The Wetland Characteristics and Ecological Functions Assessment (WCEFA) for this feature is provided in **Table 3.2, Appendix B** of this Modification Document. Six additional unevaluated wetlands (SWET-69 to SWET-74), previously unidentified by MNR, were confirmed within 120 m of the fibre optic line during site investigations in 2013. The WCEFA for these wetlands are also provided in **Table 3.2, Appendix B** of this Modification Document.

Potential wetland communities that were beyond 120 m of the fibre optic line and were not contiguous with the identified additional wetland features, as determined through air photo interpretation and site investigations, were not included.

Wildlife Habitat

Results of the site investigations for potential Candidate SWH within 120 m of the fibre optic line, using criteria from the 'Draft SWH EcoRegion 5E Criterion Schedule' (MNR, 2012), are described in **Table 3.1, Appendix B** of this Modification Document. All Candidate SWH identified in site investigations are illustrated on **Figures 3.1-3.4, Appendix A**. This includes Candidate SWH identified in the NHA/EIS (Stantec, 2013a) as previously evaluated features. The locations of Generalized Candidate SWH identified in the NHA/EIS (Stantec, 2013a) are illustrated in Figures H-5.1-5.4, Appendix H-5 of the NHA/EIA (Stantec, 2013a).

As the fibre optic line is contained within existing roadways, with no disturbance proposed outside of the existing developed area, all wildlife habitat features within 120m of the fibre optic line can be considered Generalized Candidate SWH, per Appendix D of the Natural Heritage Assessment Guide (MNR, 2012a). These features are not required to be identified individually or delineated, however they must be treated as significant and general impacts to these features must be addressed in the EIS (Section 5).

Provincial Parks and Conservation Reserves

As noted in Section 2.5, Records Review confirmed an addition to LSPP (P292) is located within 120 m of the fibre optic line. This feature was addressed in the NHA/EIS (Stantec, 2013a).

3.3 SUMMARY

Based on the site investigation, a number of natural features have been identified within 120 m of the fibre optic line. These features are summarized in **Table 3.1, Appendix B**, of this Modification Document, and are shown on **Figures 3.1-3.4, Appendix A**. For consistency with wetland and wildlife habitat features previously identified in the NHA/EIS (Stantec, 2013a), the same feature codes and numbers have been used.

4.0 Evaluation of Significance

Natural heritage information collected from the records review, the site investigation and consultations was analyzed to determine the significance and sensitivity of existing natural heritage features and their ecological functions. For all natural heritage features identified within 120 m of the fibre optic line, it was determined whether the natural heritage feature is provincially significant, significant, not provincially significant or not significant. Features previously evaluated as part of the NHA/EIS (Stantec, 2013a) are noted and results are included in this Modification Document.

Sources used in the evaluation of significance for the natural heritage features within 120 m of the fibre optic line included:

- Ontario Wetland Evaluation System Northern Manual (MNR, 2002);
- Natural Heritage Assessment Guide for Renewable Energy Projects (MNR, 2012a);
- Significant Wildlife Habitat Technical Guide (MNR, 2000a);
- Significant Wildlife Habitat Decision Support System (MNR, 2000b)
- Draft Significant Wildlife Habitat EcoRegion 5E Criterion Schedule (MNR, 2012b); and
- Selected Wildlife and Habitat Features: Inventory Manual (MNR, 2000c).

4.1 WETLANDS

Methods

Significance of wetlands is determined by the MNR using methods outlined in the Ontario Wetland Evaluation System (OWES) (MNR, 2002). Evaluated Wetlands are determined to be provincially or non-provincially significant. Non-provincially significant wetlands are those that have been evaluated but did not receive sufficient points to be considered provincially significant. Wetlands that have yet to be evaluated according to OWES are termed unevaluated wetlands.

The MNR has developed a revised method for wetland evaluation to be used in completion of an Environmental Impact Statement (EIS) for renewable energy projects. The revised method is called a Wetland Characteristics and Ecological Functions Assessment (WCEFA) and is focused on wetland attributes relevant to renewable energy projects. The criteria to be evaluated in a WCEFA are presented in Appendix C of the Natural Heritage Assessment Guide for Renewable Energy Projects (MNR, 2012a).

Due to their small size wetlands less than 0.5 ha are generally not considered candidates for evaluation under the OWES, unless directly connected to a PSW (MNR, 2002). Wetlands that did

not meet these criteria and that occurred within 120 m of the fibre optic line were subjected to a WCEFA to determine the potential impacts created by installation of the fibre optic line. Thirteen wetlands located within 120m of the fibre optic line were subject to WCEFA. Where portions of wetlands that occur within 120m of the fibre optic line extend outside the 120m, the entire wetland has been included in the assessment to ensure accurate documentation of the features and functions. A single contiguous wetland may contain several distinct wetland communities; as a result all wetland communities contiguous with wetland communities within 120m of the fibre optic line were assessed, even if the community itself was beyond 120m.

Assessments were based on GIS analysis, imagery interpretation, soil/CLI mapping, and on-site field investigations. WCEFA procedures (MNR, 2012a) are based on sections of the OWES – Northern Manual (MNR, 2002). Although WCEFA does not result in a complete evaluation of the significance of wetlands, it allows significance to be assumed and provides a method to assess wetland functions based on the criteria established in the OWES manual. A detailed description of the WCEFA is provided in Section 4.2 of the NHA/EIS (Stantec, 2013a).

Results

Findings of the WCEFA for all wetlands within 120 m of the fibre optic line are presented in **Table 3.2, Appendix B** of this Modification Document. Significance is assumed for each of these wetland features. An EIS has been completed for these features, and is provided in **Section 5.0** of this Modification Document.

4.2 WILDLIFE HABITAT

Wildlife habitats were considered to be significant if the MNR identified them as such, or when they were evaluated as significant using procedures established by MNR. As the fibre optic line is located completely within the road beds of Dump Road, Hogg Dam Road and MacKay Road, all wildlife habitat features identified within 120m of the proposed fibre optic line are located outside of the revised Project Location (existing road beds) and are Generalized. For these Generalized features, an evaluation of significance is not required. Generalized habitat is treated as significant and addressed in the EIS.

An Environmental Impact Study has been completed for all Generalized SWH, and is provided in **Section 5.0** of this Modification Document.

4.3 SUMMARY

This Natural Heritage Assessment was undertaken to identify natural features found within 120 m of the fibre optic line and evaluate their significance.

Based on an assessment of background information and the results of on-site field investigations, the following natural features requiring an Environmental Impact Study (EIS) were found within 120 m of the fibre optic line:

- Wetlands (SWET-3, 11, 12, 40, 41, 42, 60, 69, 70, 71, 72, 73 and 74);
- Generalized Candidate Significant Wildlife Habitat (see **Table 3.1**, **Appendix B**).

Significant and generalized features are shown on **Figures 4.1-4.4, Appendix A**. An EIS is required to identify and assess any negative environmental effects and develop mitigation measures for significant features that occur within 120 m of the fibre optic line.

4.4 QUALIFICATIONS

The following Stantec personnel were responsible for the application of evaluation criteria and procedures:

- Vince Deschamps, Senior Environmental Planner
- Melissa Cameron, Terrestrial Ecologist
- Natalie Leava, Terrestrial Ecologist
- James Leslie, Terrestrial Ecologist (wetland evaluation)

5.0 Environmental Impact Study

An Environmental Impact Study (EIS) is required to assess potential negative environmental effects and identify mitigation measures designed to prevent or minimize those potential negative effects to a level of insignificance.

As per O. Reg. 359/09 Project components are, with an exception, not permitted within 120 m of a provincially significant southern wetland, or in or within 120 m of, SWH. The exception is that projects may be sited within 120 m of a provincially significant southern wetland and in, or within 120 m of, SWH if an EIS is prepared that identifies and addresses any negative environmental effects on the feature and identifies mitigation measures.

As per Appendix D of the NHA Guide, there are no SWHs that require site specific discussion and mitigation as they are all located outside the underground fibre optic line. Therefore they have been treated as Generalized Candidate SWH, and are addressed through generalized mitigation measures and best management practices.

5.1 OVERVIEW

The fibre optic line portion of the revised Project Location for this Modification Document is limited to the road bed of existing roads (i.e., Dump Road, Hogg Dam Road and MacKay Road), including portions of these roads that will be upgraded. No direct disturbance to adjacent natural features is anticipated as the outer limit where site preparation and construction activities will occur is confined within these 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.

The following significant features occur within 120 m of the fibre optic line:

- Significant wetlands; and,
- Generalized Candidate Significant Wildlife Habitat

The fibre optic line in relation to the natural features boundaries is shown on **Figures 4.1-4.4, Appendix A**. Distances from each feature to the fibre optic line, at its closest point, are provided in **Table 3.1, Appendix B** of this Modification Document.

It should be noted that where updates to EIS tables from the NHA/EIS (Stantec, 2013a) were required, supplementary tables have been provided in this Modification Document (i.e., **Table 5.1, Appendix B**). If no updates were required to the EIS tables in the NHA/EIS (Stantec, 2013a), these tables may be referenced in this Modification Document where relevant.

5.2 DESCRIPTION OF PROJECT ACTIVITIES

The fibre optic line will be installed within the existing and upgraded road beds 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 by a backhoe or tracked trenching machine 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 jack-and-bore or directional drilling, with mitigation measures as required.

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 confined to the 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. All construction works will be restricted to the road beds, thereby avoiding any direct impacts to adjacent natural features. Construction works will be short term in duration (estimated less than one week to completion).

5.3 WETLANDS

All construction work associated with installation of the fibre optic line will be restricted to the existing and upgraded road beds. The revised Project Location for the fibre optic line is defined as the edges of the Dump Road, Hogg Dam Road, and MacKay Road as no site disturbance will occur beyond the road beds. Wetland features SWET-3, 11, 12, 40, 41, 42, 60, 69, 70, 71, 72, 73 and 74 are found within 120 m of the fibre optic line. Distances from each wetland to the revised Project Location is provided in **Table 3.1, Appendix B**. No wetlands have been identified within 120 m of the approximately 50 m section of the fibre optic line that will connect to the Great Lakes Power's TS from MacKay Road.

5.3.1 Potential Effects

Potential negative effects to wetlands from the installation of a fibre optic line within the road beds are expected to be limited to indirect impacts from trench creation such as sedimentation. All construction activities will be confined to the road bed and no direct loss of wetland habitat or function will occur as a result of the installation or operation of the fibre optic line.

Potential indirect effects to wetlands as a result of installation of the fibre optic line can be fully mitigated through proper use of sediment and erosion control measures along the edges of existing or upgraded roads, as described in **Section 5.5.1**.

Net Effects

No construction works or site disturbance will occur beyond the road beds. The standard mitigation measures described in **Section 5.5** will ensure that wetland form and functions will be maintained. As a result there will be no negative effect on wetlands within 120 m of the revised Project Location.

5.4 GENERALIZED CANDIDATE SIGNIFICANT WILDLIFE HABITAT

The fibre optic line portion of the revised Project Location is restricted to the existing and upgraded road beds of Dump Road, Hogg Dam Road and MacKay Road, and no wildlife habitat occurs within the road beds. In some instances the designated radius around a wildlife habitat feature may overlap with the existing roadway, however the road itself is not considered to be part of the wildlife habitat. Consequently, a number of wildlife habitat types have been identified within 120 m of, but not overlapping with, the fibre optic line. Installation of the fibre optic line is not expected to have an impact on these habitats. In accordance with the 'Natural Heritage Assessment Guide' (MNR, 2012a), potential impacts to these habitats are typically associated with the temporary disturbance of construction activity and can be grouped together as generalized impacts and mitigation measures. Wildlife habitats that require generalized consideration are identified in **Table 3.1, Appendix B** of this Modification Document.

5.5 MITIGATION MEASURES

The following best management practices and other measures intended to prevent, minimize or mitigate potential adverse effects on adjacent significant natural features will be implemented, where required during the construction and operational phases of the fibre optic line. Provided these practices and measures are properly implemented, installation and operation of the fibre optic line will not result in negative environmental effects.

5.5.1 Sediment and Erosion Control Measures

In order to minimize erosion potential and the introduction of sediment into the natural features during installation of the fibre optic line, erosion and sediment ("E&S") control measures will be implemented prior to the initiation of any construction. The E&S control measures will be installed along the edges of the existing roads as required. The E&S control measures are described in Section 5.3.2 and Table 8, Appendix B of the NHA/EIS (Stantec, 2013a). The fibre optic line will be installed in shallow trenches (i.e., 60cm) in existing road beds. Construction is estimated to take less than one week to complete. As a result, there will not be any additional E&S control measures required to mitigate the installation of the fibre optic line beyond those provided in the NHA/EIS (Stantec, 2013a).

5.5.2 Vegetation Removal

No vegetation removal will be required as part of the fibre optic line installation. All associated construction works will be confined to road beds and no site disturbance will occur beyond these limits.

5.5.3 Construction Timing

Installation of the fibre optic line should be timed to avoid sensitive periods for amphibian breeding. During construction, the roads in which the fibre optic cable will be installed will experience traffic of varying intensity.

Amphibians are at an increased risk from vehicle collisions in the spring breeding season (April 15 – June 30), particularly on cool rainy nights as they move towards the warmer road surface. Given the temporary (i.e. one week or less) nature of the construction works associated with installation of the fibre optic line and the restriction of construction activities primarily to daytime hours, the risk of increased mortality during construction is low. Some limited mortality is possible; however, the potential long-term effects to amphibian populations from this mortality are minimal.

Should construction occur during the amphibian breeding season, all trenches and other areas of excavation should be closed at the end of each work day to prevent amphibians from becoming trapped while crossing the roadway overnight.

In the event that excessive dust is generated during excavation of the trench, dust dispersal will be controlled through use of a water truck. Water extraction for dust suppression has been previously assessed in the Construction Plan Report (Stantec, 2013c). Daily water withdrawals will not exceed 50,000 l/day.

5.6 ENVIRONMENTAL EFFECTS MONITORING PLAN

The proposed fibre optic line does not require any additions to the Environmental Effects Monitoring Plan (Stantec, 2013b) as there are no expected residual impacts to the natural features within 120 m of the fibre optic line.

5.7 CONSTRUCTION MONITORING

Construction monitoring to demonstrate how any potential negative environmental effects identified in the EIS will be mitigated is required as part of the REA Application. Monitoring of mitigation employed to minimize the construction effects of the fibre optic line will be conducted as described in the monitoring plan presented in **Table 5.1, Appendix B** of this Modification Document. All mitigation measures identified in this Modification Document will be monitored to ensure negligible effects occur to the natural features and habitat functions within 120m of the fibre optic line.

6.0 Conclusions

This Natural Heritage Assessment and Environmental Impact Study – Modification Document for the Bow Lake Wind Farm has been prepared in accordance with O. Reg 359/09, s. 24-28 and 37-38.

Once the identified environmental protection and mitigation measures are applied to the natural heritage features discussed above, construction and operation of the fibre optic line will have no negative effects on natural heritage features located within 120m.

Stantec Consulting Ltd. prepared this Natural Heritage Assessment and Environmental Impact Study Modification Document for Nodin Kitagan Limited Partnership and Nodin Kitagan 2 Limited Partnership for the fibre optic line. Nodin Kitagan Limited Partnership and Nodin Kitagan 2 Limited Partnership are committed to implementing the appropriate protection and mitigation measures as they apply to the construction and operation of the fibre optic line.

Prepared by _____
(signature)

Melissa Cameron, M.Sc., MLA, Ecologist/Landscape Architect

Prepared by _____
(signature)

Vince Deschamps, M.Sc., MCIP, RPP, Senior Environmental Planner

Reviewed by _____
(signature)

David Charlton, M.Sc., P. AG., LEED AP, Senior Ecologist

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Appendix A

Figures

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5235000 5230000

N

Lake Superior
Montreal River
MacKay Road
Hog Dam Road
Dump Road
Beta Lake
Gamma Lake
Caysee Lake
Mile 67 Road
Rebecca's Road
Trim Lake Road
Bow Lake
Negick Lake
Negick Creek
Huff Lake
Queminico Lake
Alpha Lake

17

1 2 3 4 5 6 7 8 9 10 11 12 13 15 17 18 19 20 21 22 23 24 25 26 27 28 29 2a 30 32 33 34 35 36 37 38 39

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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

1. Coordinate System: NAD 1983 UTM Zone 16N
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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

680000

N

17

G191X
G101Tt
G045NH
G033Tt
SWET-11
G135S
G070Tt
G067Tt
SWET-40
G047S
G129Tt
G058Tt
G058Tt
G059Tl
G052Tt
G055Tt
G050Tt
G058Tt
Dump Road
G067Tt
G129Tt
SWET-60
G058Tt
G059Tl
G058Tt

0 250 500 m
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680000

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Revised: 2014-01-28 By: awhite

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/Underground Collector Line
- Access Road Corridor
- Collector Line Corridor
- Construction Compound
- Construction Compound & Welfare Building
- Construction Compound & Transformer Station/Operations & Maintenance Building

Existing Features

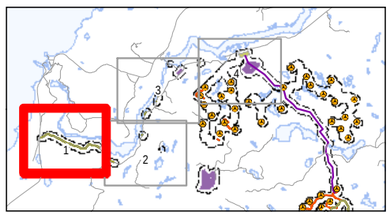
- Expressway / Highway
- Road
- Elevation Contour
- Existing Transmission Line
- Watercourse
- Waterbody
- Patent Land
- Seep

Wetlands (delineated by Stantec - SWET)

- Previously Unidentified Wetland
- Forest Ecosystem Classification

ELC/FEC Legend

G014Tt	Very Shallow, Dry to Fresh: Conifer
G033Tt	Dry, Sandy: Red Pine - White Pine Conifer
G050Tt	Dry to Fresh, Coarse: Pine - Black Spruce Conifer
G052Tt	Dry to Fresh, Coarse: Spruce - Fir Conifer
G053Tt	Dry to Fresh, Coarse: Conifer
G055Tt	Dry to Fresh, Coarse: Aspen - Birch
G058Tt	Dry to Fresh, Coarse: Maple Hardwood
G067Tt	Moist, Coarse: Spruce - Fir Conifer
G070Tt	Moist, Coarse: Aspen - Birch Hardwood
G129Tt	Organic Rich Conifer Swamp
G158Tt	Cliff
G224Tt	Mineral Rich Conifer Swamp
G134S	Mineral Thicket Swamp
G135S	Organic Thicket Swamp
G142N	Mineral Meadow Marsh
G144N	Organic Meadow Marsh
G149N	Organic Shallow Marsh
G152N	Open Water Marsh: Organic
G136Tl	Sparse Treed Fen
G139S	Poor Fen
G146N	Open Shore Fen
G045NH	Dry to Fresh, Coarse: Meadow
G047S	Dry to Fresh, Coarse: Shrub
G049Tl	Dry to Fresh, Coarse: Jack Pine - Black Spruce Dominated
G059Tl	Dry to Fresh, Coarse: MIxedwood
G142NH	Mineral Meadow Marsh
G191X	Active Waste Disposal / Landfill
G193X	Active Coarse Clean Fill
G194N	Coarse Clean Fill
OA	Open Aquatic



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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

ELC and Wetlands

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/Underground Collector Line
- Access Road Corridor
- Collector Line Corridor
- Construction Compound
- Construction Compound & Welfare Building
- Construction Compound & Transformer Station/Operations & Maintenance Building

Existing Features

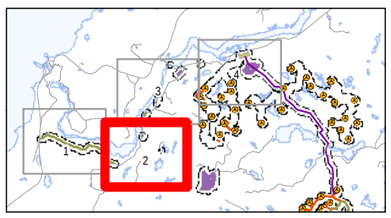
- Expressway / Highway
- Road
- Elevation Contour
- Existing Transmission Line
- Watercourse
- Waterbody
- Patent Land
- Seep

Wetlands (delineated by Stantec - SWET)

- Previously Unidentified Wetland
- Forest Ecosystem Classification

ELC/FEC Legend

G014Tt	Very Shallow, Dry to Fresh: Conifer
G033Tt	Dry, Sandy: Red Pine - White Pine Conifer
G050Tt	Dry to Fresh, Coarse: Pine - Black Spruce Conifer
G052Tt	Dry to Fresh, Coarse: Spruce - Fir Conifer
G053Tt	Dry to Fresh, Coarse: Conifer
G055Tt	Dry to Fresh, Coarse: Aspen - Birch
G058Tt	Dry to Fresh, Coarse: Maple Hardwood
G067Tt	Moist, Coarse: Spruce - Fir Conifer
G070Tt	Moist, Coarse: Aspen - Birch Hardwood
G129Tt	Organic Rich Conifer Swamp
G158Tt	Cliff
G224Tt	Mineral Rich Conifer Swamp
G134S	Mineral Thicket Swamp
G135S	Organic Thicket Swamp
G142N	Mineral Meadow Marsh
G144N	Organic Meadow Marsh
G149N	Organic Shallow Marsh
G152N	Open Water Marsh: Organic
G136Tl	Sparse Treed Fen
G139S	Poor Fen
G146N	Open Shore Fen
G045NH	Dry to Fresh, Coarse: Meadow
G047S	Dry to Fresh, Coarse: Shrub
G049Tl	Dry to Fresh, Coarse: Jack Pine - Black Spruce Dominated
G059Tl	Dry to Fresh, Coarse: MIxedwood
G142NH	Mineral Meadow Marsh
G191X	Active Waste Disposal / Landfill
G193X	Active Coarse Clean Fill
G194N	Coarse Clean Fill
OA	Open Aquatic



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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.
2.2

Title
ELC and Wetlands

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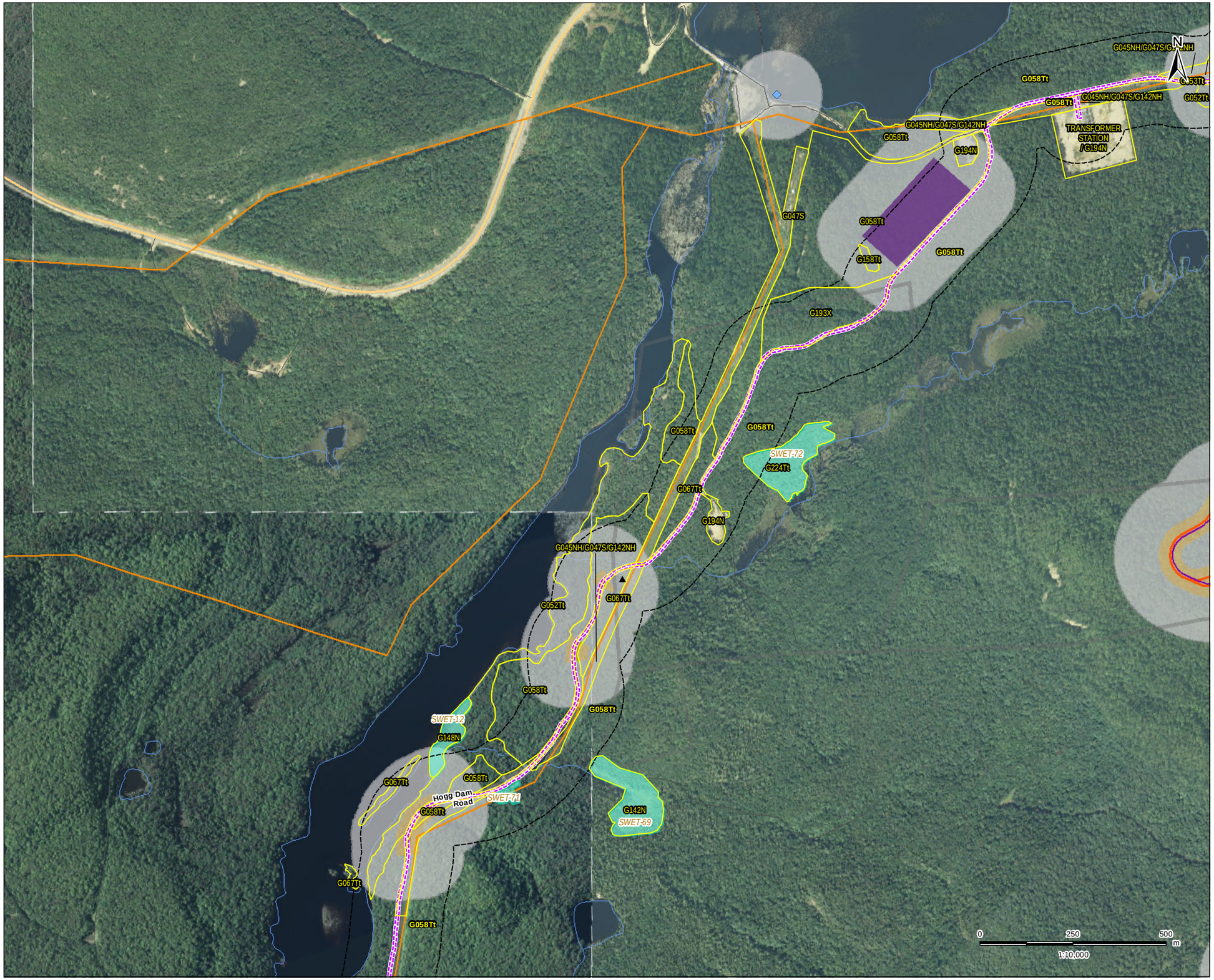

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Stantec

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/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
- Seep

Wetlands (delineated by Stantec - SWET)

- Previously Unidentified Wetland
- Forest Ecosystem Classification

ELC/FEC Legend

G014Tt	Very Shallow, Dry to Fresh: Conifer
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G052Tt	Dry to Fresh, Coarse: Spruce - Fir Conifer
G053Tt	Dry to Fresh, Coarse: Conifer
G055Tt	Dry to Fresh, Coarse: Aspen - Birch
G058Tt	Dry to Fresh, Coarse: Maple Hardwood
G067Tt	Moist, Coarse: Spruce - Fir Conifer
G070Tt	Moist, Coarse: Aspen - Birch Hardwood
G129Tt	Organic Rich Conifer Swamp
G158Tt	Cliff
G224Tt	Mineral Rich Conifer Swamp
G134S	Mineral Thicket Swamp
G135S	Organic Thicket Swamp
G142N	Mineral Meadow Marsh
G144N	Organic Meadow Marsh
G149N	Organic Shallow Marsh
G152N	Open Water Marsh: Organic
G136Tl	Sparse Treed Fen
G139S	Poor Fen
G146N	Open Shore Fen
G045NH	Dry to Fresh, Coarse: Meadow
G047S	Dry to Fresh, Coarse: Shrub
G049Tl	Dry to Fresh, Coarse: Jack Pine - Black Spruce Dominated
G059Tl	Dry to Fresh, Coarse: MIxedwood
G142NH	Mineral Meadow Marsh
G191X	Active Waste Disposal / Landfill
G193X	Active Coarse Clean Fill
G194N	Coarse Clean Fill
OA	Open Aquatic

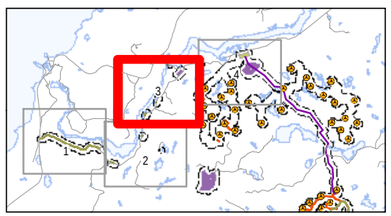

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Figure No.

2.3

Title

ELC and Wetlands

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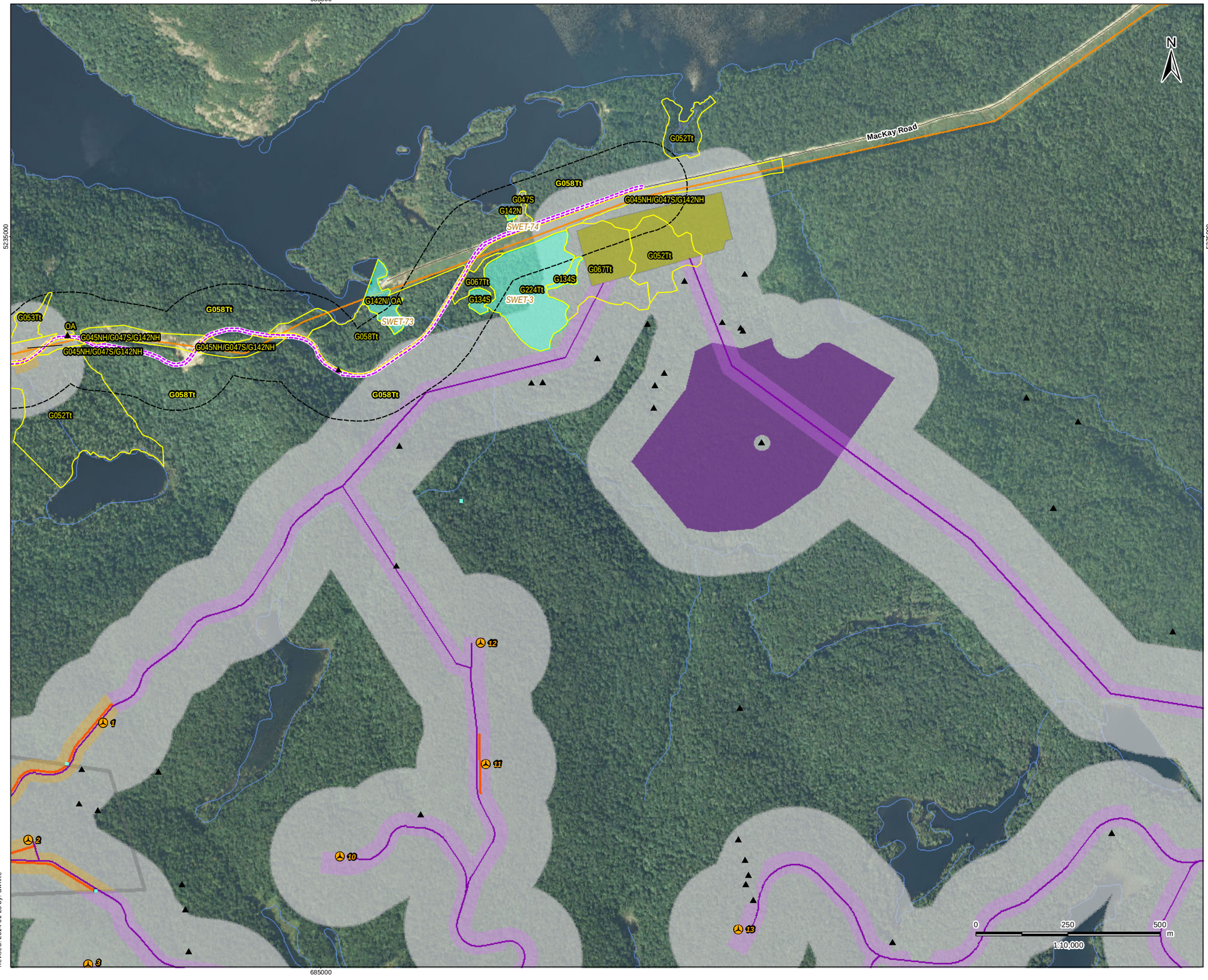

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Stantec

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/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
- Seep

Wetlands (delineated by Stantec - SWET)

- Previously Unidentified Wetland
- Forest Ecosystem Classification

ELC/FEC Legend

G014Tt	Very Shallow, Dry to Fresh: Conifer
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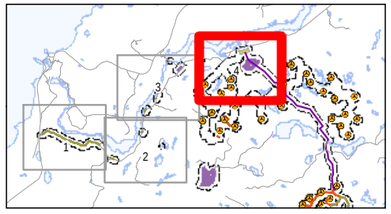
G052Tt	Dry to Fresh, Coarse: Spruce - Fir Conifer
G053Tt	Dry to Fresh, Coarse: Conifer
G055Tt	Dry to Fresh, Coarse: Aspen - Birch
G058Tt	Dry to Fresh, Coarse: Maple Hardwood
G067Tt	Moist, Coarse: Spruce - Fir Conifer
G070Tt	Moist, Coarse: Aspen - Birch Hardwood
G129Tt	Organic Rich Conifer Swamp
G158Tt	Cliff
G224Tt	Mineral Rich Conifer Swamp
G134S	Mineral Thicket Swamp
G135S	Organic Thicket Swamp
G142N	Mineral Meadow Marsh
G144N	Organic Meadow Marsh
G149N	Organic Shallow Marsh
G152N	Open Water Marsh: Organic
G136TI	Sparse Treed Fen
G139S	Poor Fen
G146N	Open Shore Fen
G045NH	Dry to Fresh, Coarse: Meadow
G047S	Dry to Fresh, Coarse: Shrub
G049TI	Dry to Fresh, Coarse: Jack Pine - Black Spruce Dominated
G059TI	Dry to Fresh, Coarse: MIxedwood
G142NH	Mineral Meadow Marsh
G191X	Active Waste Disposal / Landfill
G193X	Active Coarse Clean Fill
G194N	Coarse Clean Fill
OA	Open Aquatic



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.

2.4

Title

ELC and Wetlands

680000

N

17

OBH-1
CWH-1
ABHW-11
BHFH-1
BBH-1
CWH-2
BBH-9
OBH-82

BHFH-30
BBH-52
Dump Road
OBH-94
CWH-3
BHFH-29
ABHW-9
BBH-51

0 250 500 m
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680000

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Stantec

Legend

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

Previously Assessed Project Components

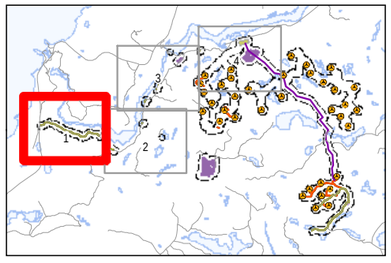
- Turbine Location
- Gate Location
- Meteorological Tower
- Proposed Water Extraction Location
- Access Road (New)
- Access Road (Upgrade)
- Overhead/Undergrou... Collector Line
- Access Road Corridor
- Collector Line Corridor
- Construction Compound
- Construction Compound & Welfare Building
- Construction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

Existing Features

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

Candidate Significant Wildlife Habitat

- Amphibian Breeding Habitat – Woodlands (ABHW)
- Boreal Bedstraw Habitat (BBH)
- Braun's Holly Fern Habitat (BHFH)
- Canada Warbler Habitat (CWH)
- Marsh Bird Breeding Habitat
- Olive-sided Flycatcher Habitat (OFH)
- Oval-leaved Bilberry Habitat (OBH)
- Turtle Overwintering Area (TWA)
- Waterfowl Nesting Area (WNA)



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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

Candidate Significant Wildlife Habitat

Stantec

Legend

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

Previously Assessed Project Components

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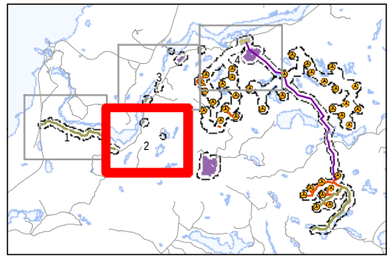

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Client/Project

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

Candidate Significant Wildlife Habitat

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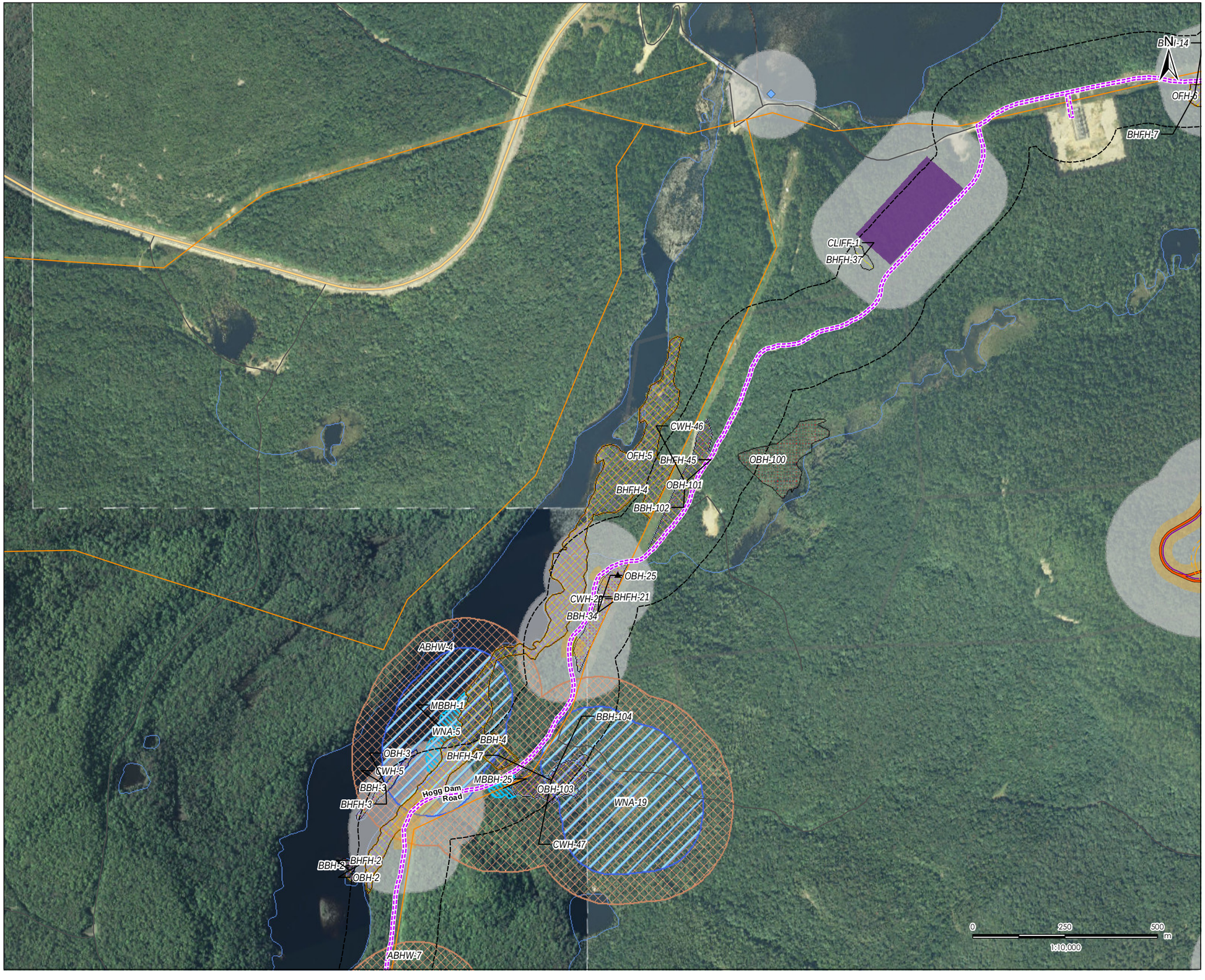

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Revised: 2014-01-28 By: cwhite

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)
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Existing Features

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- Road
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- Watercourse
- Waterbody
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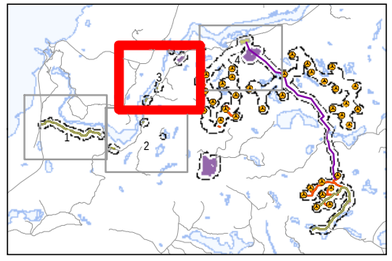
- Turtle Overwintering Area (TWA)
- Waterfowl Nesting Area (WNA)



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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.

3.3

Title

Candidate Significant Wildlife Habitat

685000

5235000

N

MacKay Road

BBH-15
BHFH-8
OFH-7
ABHW-16
TWA-10
OBH-102
CWH-39
BBH-54
BHFH-32
WNA-16
BHFH-31
OBH-95
BHFH-46
BBH-53
TWA-8
TWA-9
CWH-45
BBH-103
TWA-1
BBH-14
OBH-68
BHFH-7
OFH-6
1
2
3
10
11
12
13

0 250 500 m
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685000

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Stantec

Legend

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

Previously Assessed Project Components

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- Watercourse
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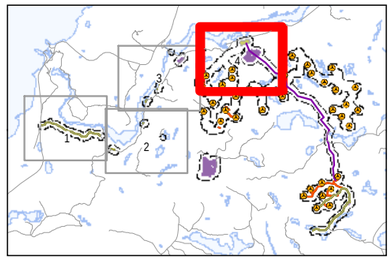

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Client/Project

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.

3.4

Title

Candidate Significant Wildlife Habitat

680000

680000

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Stantec

Legend

- 120m Zone of Investigation
- Previously Assessed 120m Zone of Investigation
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Previously Assessed Project Components

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Generalized Candidate Significant Wildlife Habitat

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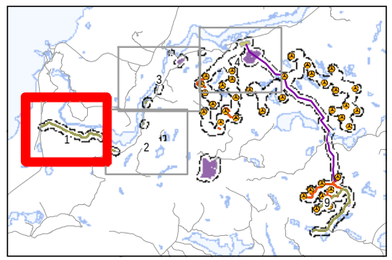
- Oval-leaved Bilberry Habitat (OBH)
- Turtle Overwintering Area (TWA)
- Waterfowl Nesting Area (WNA)

Wetlands (delineated by Stantec - SWET)

- Previously Unidentified Wetland



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Client/Project

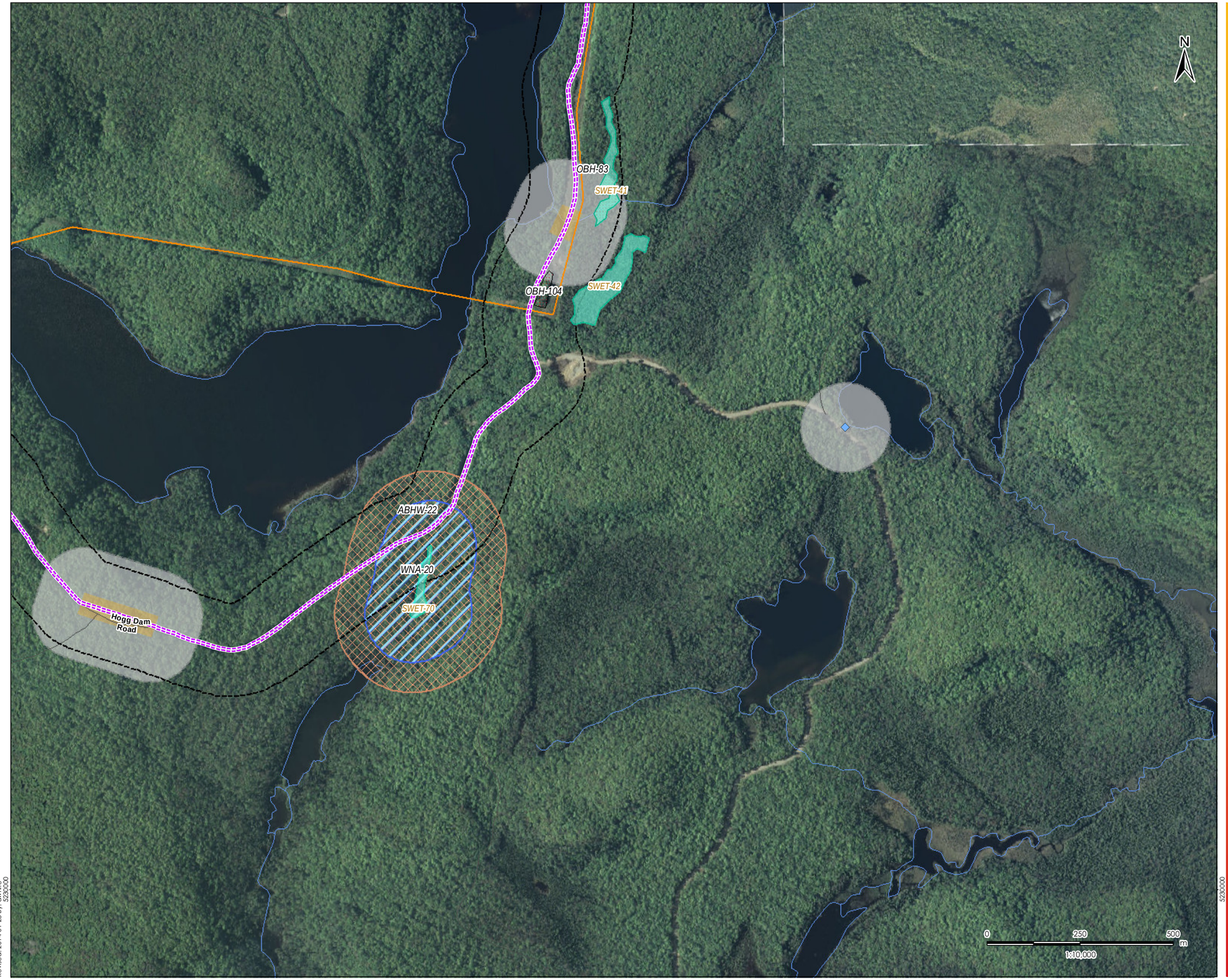
Bow Lake Wind Farm
Nodin Kitagan Limited Partnership and Nodin Kitagan 2 Limited Partnership, through their General Partners Shongwish Nodin Kitagan GP Corp. and Shongwish Nodin Kitagan 2 GP Corp.

Figure No.

4.1

Title

Significant Natural Features



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Stantec

Legend

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- Watercourse
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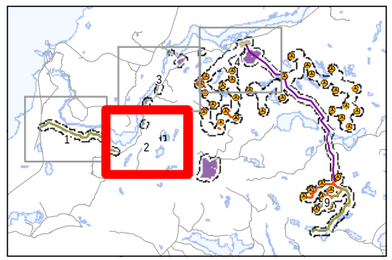

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Client/Project

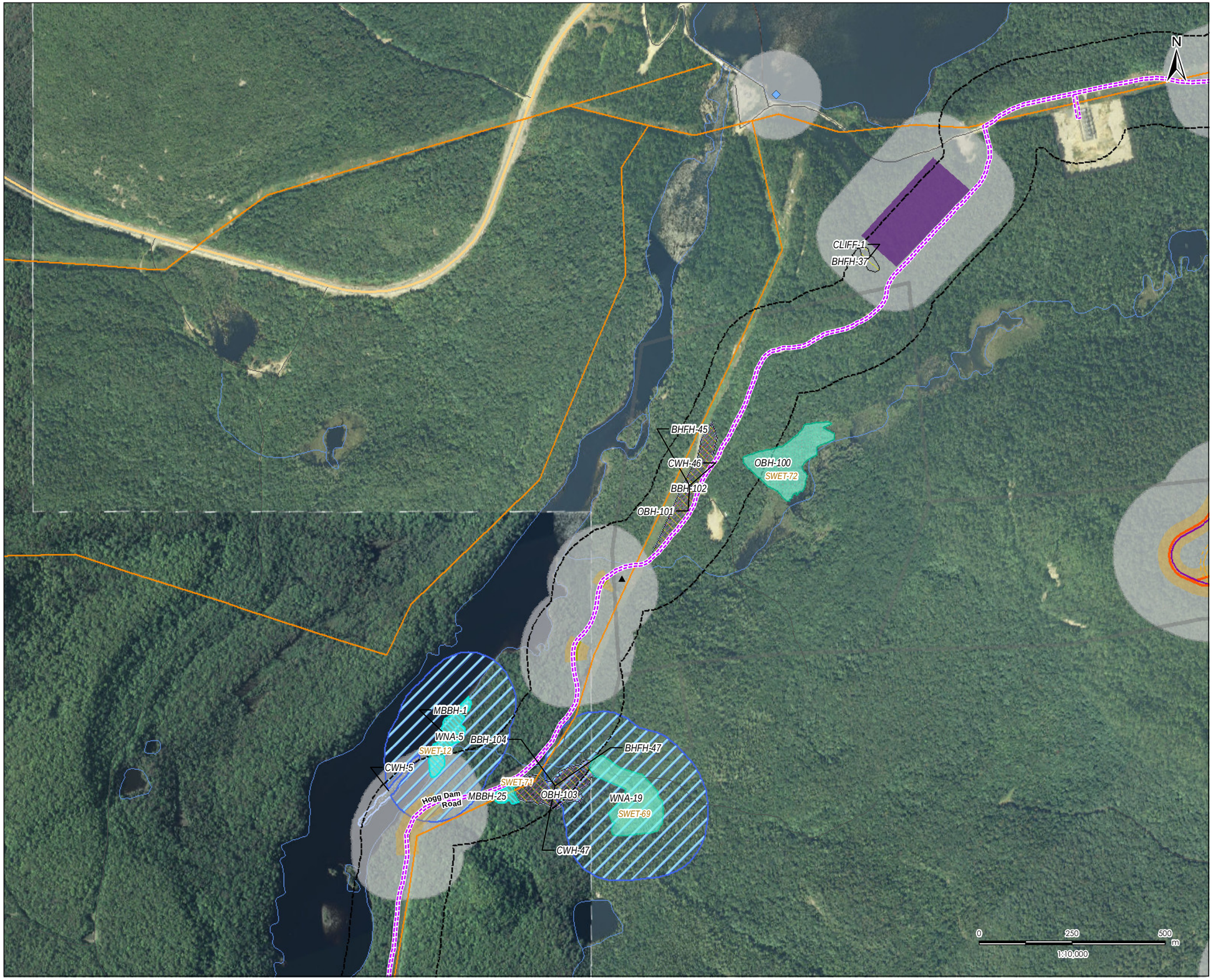
Bow Lake Wind Farm
Nodin Kitagan Limited Partnership and Nodin Kitagan 2 Limited Partnership, through their General Partners Shongwish Nodin Kitagan GP Corp. and Shongwish Nodin Kitagan 2 GP Corp.

Figure No.

4.2

Title

Significant Natural Features



Stantec

Legend

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

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Wetlands (delineated by Stantec - SWET)

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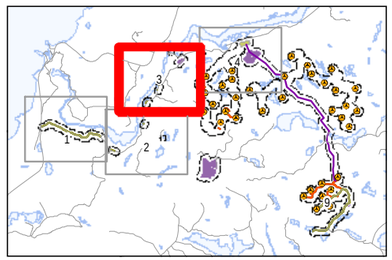

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Client/Project

Bow Lake Wind Farm
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Figure No.

4.3

Title

Significant Natural Features

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685000

5235000

N

MacKay Road

BBH-15
BHFH-8
OFH-7
SWET-74
TWA-10
OBH-102
BHFH-81
OBH-95
TWA-8
BHFH-46
BBH-53
SWET-3
TWA-9
CWH-45
BBH-103
SWET-73
OBH-68
1
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0 250 500 m
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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/Undergrou... Collector Line
Access Road Corridor
Collector Line Corridor
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Turbine Laydown Area
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Expressway / Highway
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Existing Transmission Line
Watercourse
Waterbody
Patent Land
Seep

Generalized Candidate Significant Wildlife Habitat

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Canada Warbler Habitat (CWH)
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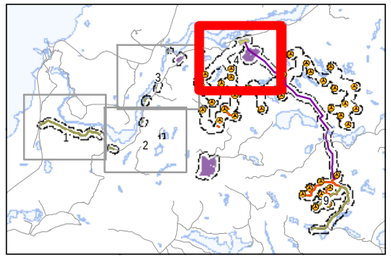
Previously Unidentified Wetland



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Client/Project

Bow Lake Wind Farm
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Figure No.

4.4

Title

Significant Natural Features

Appendix B

Tables

Table 3.1: Site Investigation Results Summary

Natural Heritage Feature	Size (ha)	Distance to Project Location (edge of existing road; m)	Composition and Attributes	Site Investigation Results	Evaluated in 2012 Bow Lake NHA/EIS?	Section in Bow Lake NHA/EIS
Wetlands	Previously unidentified wetlands within 120 m of the revised Project Location identified during the course of the site investigations were delineated during the vegetation community assessment and vascular plant surveys in 2012 and 2013. Wetland boundaries were mapped according to OWES Northern Manual, through reconciling aerial photographs and observations made during the site investigations (including delineation with GPS units).					
SWET-3	5.4	33.0	G224-Mineral Rich Conifer Swamp, G134-Mineral Thicket Swamp. Identified by Stantec. See Table 3.2 for wetland assessment.	Carried forward to EOS	✓	3.2.2
SWET-11	0.1	16.0	G135-Organic Thicket Swamp. Identified by Stantec. See Table 3.2 for wetland assessment.	Carried forward to EOS	✓	3.2.2
SWET-12	0.9	63.8	G148-Mineral Shallow Marsh. Identified by Stantec. See Table 3.2 for wetland assessment.	Carried forward to EOS	✓	3.2.2
SWET-40	1	67.9	G129-Organic Rich Conifer Swamp. Identified by Stantec. See Table 3.2 for wetland assessment.	Carried forward to EOS	✓	3.2.2
SWET-41	0.8	51.9	G129-Organic Rich Conifer Swamp. Identified by Stantec. See Table 3.2 for wetland assessment.	Carried forward to EOS	✓	3.2.2
SWET-42	1.6	99.9	G129-Organic Rich Conifer Swamp. Identified by Stantec. See Table 3.2 for wetland assessment.	Carried forward to EOS		
SWET-60	1.1	17.3	G129 G129-Organic Rich Conifer Swamp. Identified by Stantec. See Table 3.2 for wetland assessment.	Carried forward to EOS	✓	3.2.2
SWET-69	2.2	112.9	Identified by MNR (LIO). See Table 3.2for wetland assessment.	Carried forward to EOS		
SWET-70	0.4	34	G142N - Mineral Meadow Marsh. Identified by Stantec. See Table 3.2 for wetland assessment.	Carried forward to EOS		
SWET-71	0.2	5.4	G134-Mineral Thicket Swamp. Identified by Stantec. See Table 3.2 for wetland assessment.	Carried forward to EOS		
SWET-72	2.3	58.4	G224-Mineral Rich Conifer Swamp. Identified by Stantec. See Table 3.2 for wetland assessment.	Carried forward to EOS		
SWET-73	0.9	53.7	G142N - Mineral Meadow Marsh / OA – Open water. Identified by Stantec. See Table 3.2 for wetland assessment.	Carried forward to EOS		
SWET-74	0.05	28.6	G142N - Mineral Meadow Marsh / G047/ OA – Open water. Identified by Stantec. See Table 3.2 for wetland assessment.	Carried forward to EOS		
Candidate Seasonal Concentration Areas (Generalized Candidate SWH evaluated in 2012 are shown on Figures H-5.1-5.4, Appendix H-5 of the NHA/EIA (Stantec, 2013a)).						
Bat Maternity Colony	Woodlands within 120 m of the revised Project Location consist of a number of different ecosites; however, the forested area is predominantly mature deciduous and mixed forest stands. As determined in the NHA/EIS for the Bow Lake Wind Farm (Stantec 2013a), all mixedwood and deciduous forested ecosites are contiguous within the Bow Lake Wind Farm Study Area and, therefore, the forested area was assessed as one feature for candidate SWH for bat maternity colonies.					
BMRC	n/a	n/a	All woodland communities contain candidate bat maternity colony habitat.	Generalized	✓	3.2.3.1, Table 3.5
Turtle Wintering Area	Vegetation classification surveys identified the presence of four open aquatic areas with muck bottom substrates and a water depth greater than 1m within 120 m of the revised Project Location. None of these features overlap with the Project Location. In accordance with Appendix D of the 'Natural Heritage Assessment Guide' (MNR, 2012) these features are considered Generalized Candidate SWH and have been brought forward to the EIS.					

Table 3.1: Site Investigation Results Summary

Natural Heritage Feature	Size (ha)	Distance to Project Location (edge of existing road; m)	Composition and Attributes	Site Investigation Results	Evaluated in 2012 Bow Lake NHA/EIS?	Section in Bow Lake NHA/EIS
TWA-1	0.03	3.4	OA >1m in depth, with muck bottom	Generalized	✓	3.2.3.1, Table 3.5
TWA-8	0.9	49.6	G142N - Mineral Meadow Marsh / OA – Open water, > 1m in depth, with muck bottom	Generalized		
TWA-9	0.9	53.7	G142N - Mineral Meadow Marsh / OA – Open water, SWET-73	Generalized		
TWA-10	0.05	28.6	G142N - Mineral Meadow Marsh / G047/ OA – Open water, SWET-24	Generalized		
Candidate Rare Vegetation Community or Specialized Wildlife Habitat (Generalized Candidate SWH evaluated in 2012 are shown on Figures H-5.1-5.4, Appendix H-5 of the NHA/EIA (Stantec, 2013a)).						
Cliff	One treed cliff community (G158Tt, as shown on **Figure 3.3 and 4.3**) was identified as part of the NHA/EIS for the Bow Lake Wind Farm (Stantec 2013a). This treed cliff community does not overlap with the revised Project Location. In accordance with Appendix D of 'Natural Heritage Assessment Guide' (MNR, 2012), this feature is considered Generalized Candidate SWH and has been brought forward to the EIS.					
CLIFF	n/a	40.3	G158-Cliff	Generalized	✓	3.2.3.2, Table 3.6
Waterfowl Nesting Area	Site investigations indicated that wetlands >0.5ha within 240 m (the feature includes a radius of 120 m around the wetland or wetland cluster) of the revised Project Location were comprised primarily of coniferous swamp, shallow marsh, meadow marsh and deciduous swamp communities. Forested upland areas adjacent to these features are large and contiguous. Four candidate SWH for waterfowl nesting areas were identified within 120 m of the revised Project Location. While the designated radius around a wildlife habitat feature may overlap with the existing roadway, the road itself is not considered to be part of the wildlife habitat. As these features do not occur within the revised Project Location, in accordance with Appendix D of the 'Natural Heritage Assessment Guide' (MNR, 2012) these features are considered Generalized Candidate SWH and will be brought forward to the EIS.					
WNA-5	11.4	0	G148-mineral Shallow Marsh; SWET-12	Generalized	✓	3.2.3.2, Table 3.6
WNA-16	20.8	0	G067-Moist, Coarse: Spruce-Fir conifer; SWET-3	Generalized	✓	3.2.3.2, Table 3.6
WNA-19	15.1	0	G142 - Mineral Meadow Marsh	Generalized		
WNA-20	10.1	0	G142N - Mineral Meadow Marsh, SWET-70	Generalized		
Seeps and Springs	ELC/FEC and woodland habitat assessment surveys by MKI, Great Lakes Environmental (2012), as well as Stantec, of all woodlands within 120 m of the revised Project Location identified three seeps within 120m of the Project Location. Per the Draft Ecoregion 5E Criterion Schedule (MNR 2012), the area of the ELC forest ecosite containing the seeps/springs is the candidate SWH. This ELC forest ecosite does not overlap with the revised Project Location. In accordance with Appendix D of the 'Natural Heritage Assessment Guide' (MNR, 2012) this feature is considered Generalized Candidate SWH and has been brought forward to the EIS.					
SEEP	n/a	n/a		Generalized	✓	3.2.3.2, Table 3.6
Amphibian Breeding Woodland Habitat	During site investigations potential amphibian woodland breeding ponds within 320 m of the revised Project Location were assessed (feature includes a 200 m radius of adjacent forest around woodland pools), including all wetlands, areas of standing water, areas which showed evidence of holding water through the spring (based on topography and vegetation), and lakes or ponds with an area of more than 500 m^2 and lying within 120 m of woodlands were assessed. Size of pools, presence and depth of standing water, surrounding vegetation community, emergent and submergent vegetation and canopy cover were recorded. Six candidate SWH for amphibian breeding habitat (Woodland) were identified during site investigations. While the designated radius around a woodland breeding pond may overlap with the existing roadway, the road itself is not considered to be part of the wildlife habitat. Therefore, no ABHW features overlap with the revised Project Location. In accordance with Appendix D of the 'Natural Heritage Assessment Guide' (MNR, 2012) these features are considered Generalized Candidate SWH and have been brought forward to the EIS.					
ABHW-4	54.6	0	G148- Mineral Shallow Marsh, SWET-12	Generalized	✓	3.2.3.2, Table 3.6
ABHW-7	44.8	0	G129-Organic Rich Conifer Swamp, G067- Moist, Coarse: Spruce-Fir conifer; G058- Dry to Fresh, Coarse: Maple Hardwood; G052- dry to Fresh, Coarse: Spruce-Fir Conifer; G045/G047/G142-Dry to Fresh, Coarse: Meadow/Dry to Fresh, Coarse: Shrub/Mineral Meadow Marsh, SWET-41, SWET-42	Generalized	✓	3.2.3.2, Table 3.6
ABHW-9	26.3	0	G129-Organic Rich Conifer Swamp; G058- Dry to Fresh, Coarse: Maple Hardwood; G050- Dry to Fresh, Coarse: Pine-Black Spruce Conifer; G067- Moist, Coarse: Spruce-Fir conifer, SWET-60	Generalized	✓	3.2.3.2, Table 3.6
ABHW-11	21.7	0	G129-Organic Rich Conifer Swamp; G070- Moist, Coarse: Aspen-birch Hardwood; G033- Dry, Sandy: Red Pine-	Generalized	✓	3.2.3.2, Table 3.6

Table 3.1: Site Investigation Results Summary

Natural Heritage Feature	Size (ha)	Distance to Project Location (edge of existing road; m)	Composition and Attributes	Site Investigation Results	Evaluated in 2012 Bow Lake NHA/EIS?	Section in Bow Lake NHA/EIS
			white Pine Conifer; G047- Dry to Fresh: Coarse Shrub; G045- Dry to Fresh, Coarse: Red Pine-White Pine Mixedwood; G067- Moist, Coarse: Spruce-Fir conifer; G058- Dry to Fresh, Coarse: Maple Hardwood; G135 Organic Thicket Swamp, SWET-11, SWET-40			
ABHW-16	57.7	0	G045/G047/G142-G045/G047/G142-Dry to Fresh, Coarse: Meadow / Dry to Fresh, Coarse: Shrub / Mineral Meadow Marsh ; G058-Dry to Fresh, Coarse: Maple Hardwood; G134- Mineral Thicket Swamp; G224- -Mineral Rich Conifer Swamp, SWET-3	Generalized	✓	3.2.3.2, Table 3.6
ABHW-22	21.6	0	G142N - Mineral Meadow Marsh, SWET-70	Generalized		
Candidate Habitat for Species of Conservation Concern (Generalized Candidate SWH evaluated in 2012 are shown on Figures H-5.1-5.4, Appendix H-5 of the NHA/EIA (Stantec, 2013a)).						
Marsh Bird Breeding Habitat	All wetlands with shallow water and emergent aquatic vegetation within 120 m of the revised Project Location are to be considered as potential candidate SWH. Two candidate SWH for marsh bird breeding habitat were identified during site investigations within 120 m of the Project Location. In accordance with Appendix D of 'Natural Heritage Assessment Guide' (MNR, 2012), this feature will be considered Generalized Candidate SWH and have been brought forward to the EIS.					
MBBH-1	0.9	63.8	G148-mineral Shallow Marsh; SWET-12	Generalized	✓	3.2.3.3, Table 3.7
MBBH-25	0.2	5.4	G134-Mineral Thicket Swamp, SWET-71	Generalized		
Canada Warbler Habitat	The Canada Warbler is an interior forest species occupying dense, mixed coniferous or deciduous forests with closed canopy, especially wet bottomlands of cedar or alder; and shrubby undergrowth in cool moist mature woodlands with riparian habitats. The Canada Warbler usually requires at least 30 ha of interior forest habitat (MNR, 2000a). Site investigations confirmed that preferred habitat for Canada Warbler is present within 120m of the revised Project Location in ELC Ecosites G129, G224, G067 and G070. Ten candidate SWH for Canada Warbler were identified during site investigations, none of which occur within the Project Location. In accordance with Appendix D of the 'Natural Heritage Assessment Guide' (MNR, 2012) these features are considered Generalized Candidate SWH and have been brought forward to the EIS.					
CWH-1	2.3	0	G067- Moist, Coarse: Spruce-Fir conifer, SWET-11	Generalized	✓	3.2.3.3, Table 3.7
CWH-2	0.8	26.7	G070 - Moist, Coarse: Aspen-birch Hardwood	Generalized		
CWH-3	3.4	0	G129-Organic Rich Conifer Swamp; G067- Moist, Coarse: Spruce-Fir conifer, SWET-60	Generalized	✓	3.2.3.3, Table 3.7
CWH-5	0.4	83.4	G067- Moist, Coarse: Spruce-Fir conifer	Generalized	✓	3.2.3.3, Table 3.7
CWH-21	2.6	4.7	G129-Organic Rich Conifer Swamp; G067- Moist, Coarse: Spruce-Fir conifer, SWET-41	Generalized	✓	3.2.3.3, Table 3.7
CWH-22	1.1	0.3	G067- Moist, Coarse: Spruce-Fir conifer	Generalized	✓	3.2.3.3, Table 3.7
CWH-39	8.2	34.8	G067- Moist, Coarse: Spruce-Fir conifer; SWET-3	Generalized	✓	3.2.3.3, Table 3.7
CWH-45	0.6	3.0	G067 - Moist, Coarse: Spruce-Fir conifer	Generalized		
CWH-46	1.3	0	G067 - Moist, Coarse: Spruce-Fir conifer	Generalized		
CWH-47	1.5	6.7	G067 - Moist, Coarse: Spruce-Fir conifer	Generalized		
Olive-sided Flycatcher Habitat	The Olive-sided Flycatcher prefers semi-open, conifer forest, particularly spruce forests near ponds, lakes or rivers. Burns with dead trees for perching are also important components of their habitat (MNR, 2000a). Typically the Olive-sided Flycatcher breeds in the boreal forest, where it uses coniferous trees to support its cup-shaped nest (Cadman *et al.*, 2007). Site investigations confirmed that preferred habitat for the Olive-sided Flycatcher is present within 120 m of the revised Project Location. All moist coniferous woodlands including ELC codes G129, G052, G067, G101, G050, G053 and G014 are considered candidate SWH. Three candidate SWH for Olive-sided Flycatcher were identified during site investigations, none of which occur within the revised Project Location. In accordance with Appendix D of the 'Natural Heritage Assessment Guide' (MNR, 2012) these features are considered Generalized Candidate SWH and have been brought forward to the EIS.					
OFH-5	11.2	0	G052-dry to Fresh, Coarse: Spruce-Fir Conifer	Generalized	✓	3.2.3.3, Table 3.7
OFH-6	8.6	2.1	G052-dry to Fresh, Coarse: Spruce-Fir Conifer	Generalized	✓	3.2.3.3, Table 3.7
OFH-7	1.3	107.2	G052-dry to Fresh, Coarse: Spruce-Fir Conifer	Generalized	✓	3.2.3.3, Table 3.7

Table 3.1: Site Investigation Results Summary

Natural Heritage Feature	Size (ha)	Distance to Project Location (edge of existing road; m)	Composition and Attributes	Site Investigation Results	Evaluated in 2012 Bow Lake NHA/EIS?	Section in Bow Lake NHA/EIS
Oval-leaved Bilberry Habitat	Oval-leaved bilberry may be present in moist coniferous woods, transitional habitats adjacent to coniferous stands, cut-over coniferous woods, verges of road cuts, or mixed woods (Reznicek et al., 2011, Flora of N.A. Editorial committee, 1993). Suitable habitat is located in ELC communities G070, G067, G224, and G129. Based on the records review and site investigations, habitat for oval-leaved bilberry is locally abundant within the Bow Lake Wind Farm Study Area. Fourteen candidate SWH for oval-leaved bilberry were identified during site investigations, none of which occur within the revised Project Location. In accordance with Appendix D of the 'Natural Heritage Assessment Guide' (MNR, 2012) these features are considered Generalized Candidate SWH and have been brought forward to the EIS.					
OBH-1	2.3	0	G067- Moist, Coarse: Spruce-Fir conifer	Generalized	✓	3.2.3.3, Table 3.7
OBH-2	0.1	107.3	G067- Moist, Coarse: Spruce-Fir conifer	Generalized	✓	3.2.3.3, Table 3.7
OBH-3	0.4	84.3	G067- Moist, Coarse: Spruce-Fir conifer	Generalized	✓	3.2.3.3, Table 3.7
OBH-25	1.1	0.3	G067- Moist, Coarse: Spruce-Fir conifer	Generalized	✓	3.2.3.3, Table 3.7
OBH-68	0.5	19.1	G058- Dry to Fresh, Coarse: Maple Hardwood	Generalized	✓	3.2.3.3, Table 3.7
OBH-82	1.0	67.9	SWET-40	Generalized	✓	3.2.3.3, Table 3.7
OBH-83	0.8	51.9	G129- Organic Rich Conifer Swamp; SWET-41	Generalized	✓	3.2.3.3, Table 3.7
OBH-94	1.1	17.3	G129- Organic Rich Conifer Swamp; SWET-60	Generalized	✓	3.2.3.3, Table 3.7
OBH-95	4.9	36.2	G067- Moist, Coarse: Spruce-Fir conifer; SWET-3	Generalized	✓	3.2.3.3, Table 3.7
OBH-100	2.3	57.9	G224 - Mineral Rich Conifer Swamp	Generalized		
OBH-101	1.3	0	G067 - Moist, Coarse: Spruce-Fir conifer	Generalized		
OBH-102	0.5	0	G067 - Moist, Coarse: Spruce-Fir conifer	Generalized		
OBH-103	1.5	6.7	G067 - Moist, Coarse: Spruce-Fir conifer	Generalized		
OBH-104	0.24	7.4	G058- Dry to Fresh, Coarse: Maple Hardwood	Generalized		
Boreal Bedstraw Habitat	Boreal bedstraw is known to occur within coniferous and deciduous woods (Reznicek *et al.*, 2011, Flora of N.A. Editorial committee, 1993). Based on information provided by MNR, this species utilizes microhabitats such as seeps and springs, and perhaps other wet areas such as infiltration sites. Seventeen candidate SWH for Boreal bedstraw were identified during site investigations, none of which occur within the revised Project Location. In accordance with Appendix D of the 'Natural Heritage Assessment Guide' (MNR, 2012) these features are considered Generalized Candidate SWH and will be brought forward to the EIS.					
BBH-1	2.3	0	G067- Moist, Coarse: Spruce-Fir conifer. Suitable habitat is more likely to occur in small, moist inclusions or intermittent stream corridors within this community.	Generalized	✓	3.2.3.3, Table 3.7
BBH-2	0.1	107.3	G067- Moist, Coarse: Spruce-Fir conifer	Generalized	✓	3.2.3.3, Table 3.7
BBH-3	0.4	83.4	G067- Moist, Coarse: Spruce-Fir conifer	Generalized	✓	3.2.3.3, Table 3.7
BBH-4	11.2	0	G052-dry to Fresh, Coarse: Spruce-Fir Conifer	Generalized	✓	3.2.3.3, Table 3.7
BBH-9	1.4	26.7	G070- Moist, Coarse: Aspen-birch Hardwood, G129- Organic Rich Conifer Swamp	Generalized	✓	3.2.3.3, Table 3.7
BBH-14	8.6	2.1	G052- dry to Fresh, Coarse: Spruce-Fir Conifer	Generalized	✓	3.2.3.3, Table 3.7
BBH-25	0.4	0	G067- Moist, Coarse: Spruce-Fir conifer.	Generalized	✓	3.2.3.3, Table 3.7
BBH-32	4.4	4.2	G129- Organic Rich Conifer Swamp ,G067- Moist, Coarse: Spruce-Fir conifer	Generalized	✓	3.2.3.3, Table 3.7
BBH-33	0.8	49.3	G052-dry to Fresh, Coarse: Spruce-Fir Conifer	Generalized	✓	3.2.3.3, Table 3.7
BBH-34	1.1	0.3	G067- Moist, Coarse: Spruce-Fir conifer	Generalized	✓	3.2.3.3, Table 3.7
BBH-51	5.9	0	G129- Organic Rich Conifer Swamp ,G067- Moist, Coarse: Spruce-Fir conifer	Generalized	✓	3.2.3.3, Table 3.7
BBH-52	4.1	52.8	G052-dry to Fresh, Coarse: Spruce-Fir Conifer	Generalized	✓	3.2.3.3, Table 3.7
BBH-54	6.8	34.8	G067- Moist, Coarse: Spruce-Fir conifer	Generalized	✓	3.2.3.3, Table 3.7
BBH-15	1.3	107.2	G052-dry to Fresh, Coarse: Spruce-Fir Conifer	Generalized	✓	3.2.3.3, Table 3.7

Table 3.1: Site Investigation Results Summary

Natural Heritage Feature	Size (ha)	Distance to Project Location (edge of existing road; m)	Composition and Attributes	Site Investigation Results	Evaluated in 2012 Bow Lake NHA/EIS?	Section in Bow Lake NHA/EIS
BBH-53	0.6	3.0	G067 - Moist, Coarse: Spruce-Fir conifer	Generalized	✓	3.2.3.3, Table 3.7
BBH-102	1.3	0	G067 - Moist, Coarse: Spruce-Fir conifer	Generalized		
BBH-103	0.5	3.0	G067 - Moist, Coarse: Spruce-Fir conifer	Generalized		
BBH-104	1.5	6.7	G067 - Moist, Coarse: Spruce-Fir conifer	Generalized		
Braun's Holly Fern Habitat	Braun's holly fern may occur in moist deciduous or mixed conifer-hardwood forests on slopes and in ravines, and especially frequent in rocky woods; some historical records from conifer plantations (Reznicek et al., 2011, Flora of N.A. Editorial committee, 1993). Seventeen candidate SWH for Braun's holly fern were identified within 120 m of the revised Project Location during site investigations, none of which occur within the revised Project Location. In accordance with Appendix D of the 'Natural Heritage Assessment Guide' (MNR, 2012) these features are considered Generalized Candidate SWH and have been brought forward to the EIS.					
BHFH- 1	2.3	0	G067- Moist, Coarse: Spruce-Fir conifer	Generalized	✓	3.2.3.3, Table 3.7
BHFH-2	0.1	107.3	G067- Moist, Coarse: Spruce-Fir conifer	Generalized	✓	3.2.3.3, Table 3.7
BHFH-3	0.4	83.4	G067- Moist, Coarse: Spruce-Fir conifer	Generalized	✓	3.2.3.3, Table 3.7
BHFH-4	11.2	0	G052-dry to Fresh, Coarse: Spruce-Fir Conifer	Generalized	✓	3.2.3.3, Table 3.7
BHFH-7	8.6	2.1	G052-dry to Fresh, Coarse: Spruce-Fir Conifer	Generalized	✓	3.2.3.3, Table 3.7
BHFH-19	3.6	4.2	G067- Moist, Coarse: Spruce-Fir conifer	Generalized	✓	3.2.3.3, Table 3.7
BHFH-20	0.8	49.3	G052- dry to Fresh, Coarse: Spruce-Fir Conifer	Generalized	✓	3.2.3.3, Table 3.7
BHFH-21	1.1	0.3	G067- Moist, Coarse: Spruce-Fir conifer	Generalized	✓	3.2.3.3, Table 3.7
BHFH-29	4.8	0	G067- Moist, Coarse: Spruce-Fir conifer	Generalized	✓	3.2.3.3, Table 3.7
BHFH-30	4.1	52.8	G052- dry to Fresh, Coarse: Spruce-Fir Conifer	Generalized	✓	3.2.3.3, Table 3.7
BHFH-32	6.8	34.8	G067- Moist, Coarse: Spruce-Fir conifer	Generalized	✓	3.2.3.3, Table 3.7
BHFH-8	1.3	107.2	G052-dry to Fresh, Coarse: Spruce-Fir Conifer	Generalized	✓	3.2.3.3, Table 3.7
BHFH-31	0.6	3.0	G067- Moist, Coarse: Spruce-Fir conifer	Generalized	✓	3.2.3.3, Table 3.7
BHFH-37	0.2	40.3	G158- Cliff	Generalized	✓	3.2.3.3, Table 3.7
BHFH-45	1.3	0	G067 - Moist, Coarse: Spruce-Fir conifer	Generalized		
BHFH-46	0.5	3.0	G067 - Moist, Coarse: Spruce-Fir conifer	Generalized		
BHFH-47	1.5	6.7	G067 - Moist, Coarse: Spruce-Fir conifer	Generalized		
Uhler's Sundragon Habitat	Uhler's Sundragon is provincially rare but locally common throughout much of Northern Ontario where suitable habitat is present. Habitat includes clear, slow-moving forest streams, beaver ponds and lakes with low acidity (Jones *et al.*, 2008; Dunkle, 2000). Site investigations confirmed that suitable habitat for Uhler's Sundragon is present in wetlands within 120 m of, but not overlapping with, the revised Project Location. Per Table 16, Appendix D of the 'Natural Heritage Assessment Guide' (MNR, 2012) these features are considered Generalized Candidate SWH and have been brought forward to the EIS.					
UHLS	n/a	n/a		Generalized	✓	3.2.3.3, Table 3.7
Provincial Parks and Conservation Reserves						
Lake Superior Provincial Park addition (P292)	n/a	41.7		Identified during records review. No site investigation required, carried forward to EIS.	✓	3.2.4

Table 3.2: Results of Wetland Assessment (WCEFA)

Wetland #	Size (ha)	Site Type	Wetland Type	Vegetation Forms	Proximity to other wetlands (approx.)	Interspersion (estimate)	Flood Attenuation	Open Water Types	Ground Water Recharge (Site Type)	Ground Water Recharge (Soils)	Downstream Water Quality Improvement (Watershed Improvement Factor)	Downstream Water Quality Improvement (Adjacent and Watershed Land Use)	Groundwater Discharge	Shoreline Erosion	Rare Species	Potential Significant Features	Fish Habitat
3	5.4	Palustrine	Swamp	c, h, ts, gc, m	200m	70	Headwater wetland; 25 ha catchment	No open water	Wetland not lacustrine	Permeable; substrate not clay or bedrock	Palustrine with permanent inflow	None	No evidence of discharge observed	Not applicable	Vaccinium ovalifolium	WNA-16, OBH-4	Absent
11	0.1	Isolated	Swamp	ts, gc, m, ne	100m	30	Isolated wetland	No open water	Wetland not lacustrine	Permeable; substrate not clay or bedrock	Isolated	None	No evidence of discharge observed	Not applicable	None known to be present	None	Absent
12	0.9	Riverine	Marsh	ne, re, gc	400m	60	Riverine wetland; 60 ha catchment	Type 1	Wetland not lacustrine	Permeable; substrate not clay or bedrock	Riverine	Tertiary road corridor	No evidence of discharge observed	Emergent vegetation present	None known to be present	WNA-5	Present in river
40	1	Isolated	Swamp	c, h, ts, gc, m	100m	55	Isolated wetland	No open water	Wetland not lacustrine	Permeable; substrate not clay or bedrock	Isolated	Major road corridor	No evidence of discharge observed	Not applicable	None known to be present	None	Absent
41	0.8	Palustrine	Swamp	c, h, ts, gc, m	70m	60	Mid-reach wetland; 64 ha catchment	No open water	Wetland not lacustrine	Permeable; substrate not clay or bedrock	Palustrine with permanent inflow	None	No evidence of discharge observed	Not applicable	None known to be present	None	Absent
42	1.6	Palustrine	Swamp, Marsh	h, gc, ne	70m	50	Mid-reach wetland; 40 ha catchment	No open water	Wetland not lacustrine	Permeable; substrate not clay or bedrock	Palustrine with intermittent inflow	None	No evidence of discharge observed	Not applicable	None known to be present	None	Absent
60	1.1	Isolated	Swamp	c, h, ts, gc, m	500m	60	Isolated wetland	No open water	Wetland not lacustrine	Permeable; substrate not clay or bedrock	Isolated	None	No evidence of discharge observed	Not applicable	None known to be present	None	Absent
69	2.2	Palustrine	Marsh	N/A	100m	50	Headwater wetland	No open water	Wetland not lacustrine	Permeable; substrate not clay or bedrock	Palustrine wetland with intermittent inflow	None	N/A	Not applicable	N/A	None	Absent
70	0.4	Palustrine	Marsh	N/A	155m	50	Mid-reach wetland; 460 ha catchment	No open water	Wetland not lacustrine	Permeable; substrate not clay or bedrock	Palustrine wetland with intermittent inflow	Tertiary road corridor	N/A	Not applicable	N/A	WNA-20	Absent
71	0.2	Palustrine	Swamp	ts	190m	40	Mid-reach wetland; 45 ha catchment	No open water	Wetland not lacustrine	Permeable; substrate not clay or bedrock	Palustrine wetland with intermittent inflow	Tertiary road corridor	N/A	Not applicable	N/A	None	Absent

Table 3.2: Results of Wetland Assessment (WCEFA)

Wetland #	Size (ha)	Site Type	Wetland Type	Vegetation Forms	Proximity to other wetlands (approx.)	Interspersion (estimate)	Flood Attenuation	Open Water Types	Ground Water Recharge (Site Type)	Ground Water Recharge (Soils)	Downstream Water Quality Improvement (Watershed Improvement Factor)	Downstream Water Quality Improvement (Adjacent and Watershed Land Use)	Groundwater Discharge	Shoreline Erosion	Rare Species	Potential Significant Features	Fish Habitat
72	2.3	Riverine	Swamp	c	1m	35	Riverine wetland; 180 ha catchment	No open water	Wetland not lacustrine	Permeable; substrate not clay or bedrock	Riverine	Tertiary road corridor	N/A	Trees and shrubs present	N/A	None	Absent
73	0.9	Riverine	Marsh	N/A	122m	50	Riverine wetland; 375 ha catchment	Type 1	Wetland not lacustrine	Permeable; substrate not clay or bedrock	Riverine	None	N/A	Trees and shrubs present	N/A	WNA-16	Present
74	0.05	Isolated	Marsh	gc	50m	30	Isolated wetland	No open water	Wetland not lacustrine	Permeable; substrate not clay or bedrock	Isolated	Tertiary road corridor	N/A	Not applicable	N/A	None	Absent

Table 5.1: Monitoring Plan

Potential Negative Effect	Mitigation Strategy	Performance Objective	Monitoring Plan				Contingency Measures
			Methods	Location	Frequency	Rationale	
CONSTRUCTION							
Dust generation, sedimentation and erosion to wetland and woodland habitats during construction	Silt barriers to be erected along wetlands and woodland edges that occur within 30 m of construction work Excessive dust dispersal during trench excavation will be controlled through use of a watering truck	Silt barriers to be effective and remain in good repair Minimize dust generation and control dispersal	Visual inspection of silt barriers Use of a watering truck during excavation. Daily water withdrawals will not exceed 50,000L/day	All silt barriers Roadway where excavation is taking place	At least twice per week and during and after rain events Only when excessive dust is generated by excavation	n/a	Repair any gaps or holes in silt barriers Ensure silt barriers are functioning as intended and remove any silt accumulations that may reduce effectiveness. More frequent watering during excavation
Contamination of natural heritage features through accidental spill	Keep emergency spill kits on-site. All equipment to be kept free of leaks or excess grease. Any equipment with an identified leak will be repaired prior to continuing use. Daily inspections of the hydraulic and fuel systems on machinery and leaks will be repaired immediately. Vehicle washing, refueling stations, and chemical storage will be located more than 30 m from natural features or water bodies. Proper storage of materials off-site in storage containers Adherence to Emergency Response Plan Contact MOE Spills Action Centre and MNR	Minimize likelihood of spill and impacts to natural features and wildlife habitats. Avoid contamination of water bodies or wetland features Contain spills at point of incident	Keep emergency spill kits on-site. Daily inspections of the hydraulic and fuel systems on machinery and leaks will be repaired immediately. Vehicle washing, refueling stations, and chemical storage will be located more than 30 m from natural features or water bodies. Proper storage of materials off-site in storage containers	Equipment and chemical storage areas Vehicle washing & refueling station	On-going during installation of fibre optic line.	n/a	Follow-up monitoring /inspections in the event of an accidental spill/leak Remedial actions may be required in the event monitoring indicates a negative effect to natural features

Appendix C

Qualifications

Vince Deschamps BES (Hons.), M.Sc.

Senior Environmental Planner

Vince Deschamps is a senior environmental planner with over 20 years of experience in Canada and abroad, conducting environmental assessments, resource economics, conservation planning and biological inventories. Vince has focused on assessing ecological components of urban and aggregate development proposals for conformity with municipal OPs, the PPS and the Aggregate Resources Act, as well as Natural Heritage Assessments for renewable energy projects under the Renewable Energy Approval (REA) process. Projects have included development and coordination of complex ecological field investigations, including management of staff and subconsultants, data analysis, including assessment of impacts to ecological receptors, and reporting. Vince's familiarity with applicable legislation and the regulatory authorities serves our clients well; his experiences with private, public and NGO sectors lend him a creative and thoughtful approach to project development, delivery and evaluation. Vince lived and worked in Indonesia for five years, where he specialized in assessing impacts of development activities on biodiversity, specifically regarding the IFC's Performance Standard 6–Biodiversity Conservation and Sustainable Natural Resource Management. As a result, he has a keen sense of cultural and political sensitivities that influence the processes bearing on a project's outcome. This translates well into Vince's frequent consultation with stakeholders from all levels, including government and NGOs. His strong interpersonal skills, analytical, writing and presentation abilities are supported by a high level of organization, aiding in the timely and accurate completion of projects.

EDUCATION

M.Sc., University of Guelph / Rural Planning and Development, Guelph, Ontario, 2000

B.E.S. (Hons.), University of Waterloo / Environment and Resource Studies, Waterloo, Ontario, 1988

Certificate, Ontario Ministry of Natural Resources / Ecological Land Classification System for Southern Ontario, Kingston, Ontario, 2006

MEMBERSHIPS

Full Member, Canadian Institute of Planners

Full Member, Ontario Professional Planners Institute

Verification Service Provider, "Towards Sustainable Mining" Initiative, Mining Association of Canada

PROJECT EXPERIENCE

Renewable Energy

Natural Heritage Assessments for Various Renewable Energy Projects Under the Renewable Energy Approvals Process, Ontario (Environmental Planner)

Projects involved assessment of development impact on the natural environment and recommending monitoring strategies in conformity with the REA process include:

- Sydenham Wind Energy Centre, Townships of Brooke-Alvinston and Dawn-Euphemia, ON
- Suncor Energy Adelaide Wind Power Project, Municipality of Adelaide-Metcalfe, ON
- Suncor Energy Cedar Point Wind Power Project, Town of Plympton-Wyoming and the Municipality of Lambton Shores, ON
- Bow Lake Wind Farm, Townships of Smilsky and Peever, ON

Environmental Permitting for Bluewater, Goshen and Jericho Wind Energy Centres, NextEra Energy Canada*, Huron and Lambton Counties, Ontario (Project Manager)

Served as project manager for the environmental permitting for the Bluewater, Goshen and Jericho Wind Farms proposed by NextEra Energy Canada in Huron and Lambton Counties in Ontario. These wind centres have a maximum generating capacity of 480 MW. Environmental permitting for the wind energy centres was undertaken in accordance with the recent Renewable Energy Approval (REA) process, as required under the 2009 Green Energy Act. Provided overall management responsibilities for the assignment, including project administration and the timely provision of deliverables, as well as serving as the primary point of contact for NextEra Energy Canada for the assignment.

** denotes projects completed with other firms*

Vince Deschamps BES (Hons.), M.Sc.

Senior Environmental Planner

Environmental Impact Assessments

Biodiversity Management Rosia Montana Project, Rosia Montana Gold Corporation S.A., Romania (2003-2004) (Biodiversity Specialist)

Vince was a member of the Stantec consulting team that conducted an Environmental Impact Assessment of the Rosia Montana Gold Corporation S.A. proposed Rosia Montana Project in Romania. Among other project-related tasks, he was responsible for producing the Biodiversity Conservation Plan, drafting several sections of the EIA report, coordinating biological field surveys in Romania, and acquiring and analyzing data from other project consultants.

Martabe Project Biodiversity Management and Impact Assessment, Newmont Mining, Indonesia (2004-2005)* (Biodiversity Specialist)

Vince was part of the MWH Global team conducting preliminary feasibility studies for Newmont Mining Corporation for development of the Martabe gold mine project in North Sumatra, Indonesia. Vince was responsible for reviewing ecological baseline studies conducted in the Martabe Project Area (MPA) on behalf of Newmont, identifying key ecological issues, potential impacts and developing management options for the proposed project. Key to the development of the biodiversity component of the feasibility study was the presence of globally threatened species in and adjacent to the MPA, and accelerating forest cover loss as a result of unsustainable land conversion by local communities.

External Environmental Audit, PT Freeport, Indonesia (2005)* (Biodiversity Specialist)

As a sub-consultant to MWH Global, Vince participated in the 2005 External Environmental Audit of the PT Freeport Indonesia (PTFI) mining operation in Papua, Indonesia. The audit is required on a periodic basis by the current Contract of Work established between the Government of Indonesia and PTFI, and is focused on evaluation of: compliance with specific COW requirements and applicable regulations; the effectiveness of PTFI's environmental management system, practices, and procedures in actual practice; and, the level to which PTFI's operations employs internationally recognized best management practices for the management and mitigation of its environmental impacts. In his role as an Audit Team member, Vince was responsible for the evaluation of biodiversity and ecological impacts, particularly in relation to the restoration, rehabilitation and monitoring of the Ajkwa Deposition Area and excavated/waste rock stockpile areas in the highlands. Given his fluency in Bahasa Indonesia, Vince was also called upon to assist in the evaluation of regulatory compliance issues and provide translation assistance to other audit team members as circumstances required.

Biodiversity Evaluation, PT Holcim Indonesia, Tuban, East Java (2008)* (Biodiversity Specialist)

Served as the Lead Consultant for a biodiversity evaluation of Holcim's proposed PT. Semen Dwima Agung Cement Operation near Tuban, East Java. The International Finance Corporation (IFC) requested Holcim to conduct an independent expert evaluation of the biodiversity analysis conducted for the Project ESIA (ANDAL) within the context of the IFC Performance Standard 6 – Conservation of Biodiversity and Sustainable Resource Management (PS6). In addition to the evaluation of the content of the ANDAL, the evaluation also provided a series of recommendations to further understand conditions at the project site and bolster PT Holcim Indonesia's effort to minimize impacts on terrestrial flora and fauna in the project area.

** denotes projects completed with other firms*

Vince Deschamps BES (Hons.), M.Sc.

Senior Environmental Planner

Eramet/Weda Bay Nickel BFS ESHIA, Halmahera, Indonesia (2009-2011)* (Terrestrial Biodiversity Team Leader)

Currently engaged as the Team Leader for Technical Memorandum 01 (TM01, Terrestrial Biodiversity) for Weda Bay Nickel's "Bankable Feasibility Study-Environmental, Social and Health Impact Assessment" (BFS ESHIA). Working with the BFS ESHIA Project Manager and Technical Director to ensure timely delivery of all outputs related to Terrestrial Biodiversity. This includes providing oversight and guidance to experts from the Indonesian Institute of Sciences Research Centre for Biology (LIPI) to design and conduct field investigations, analyzing the results of these investigations, assessing potential impacts to terrestrial biodiversity as a result of mine development, and recommending mitigations to minimize these impacts. Responsible for the preparation of the Terrestrial Biodiversity Baseline Report, Terrestrial Biodiversity Action Plan and integrating these documents into the overall BFS ESHIA Report. Fieldwork and reporting will be in compliance with the Equator Principles, IFC Performance Standards, and any other guidelines to be designated by Weda Bay Nickel.

Peer Reviews of Other Consultants' Ecological Reports for Various Land Development Proposals and Projects on Behalf of Various Municipalities*, Ontario (Lead Reviewer)

Conducted ecological peer reviews on behalf of various municipalities. Projects included:
- Island Lake Golf and Country Club Community Environmental Impact Study and Proposed French Drive Road Extension, Town of Mono, ON
- Environmental Impact Assessment, Part of North Half of Lot 16 and Part Lot 17, Concession 4, Township of Adjala-Tosorontio, ON
- Hamount and Valleygrove Lands - Dufferin County Road #16 Township of Amaranth Environmental Impact Statement, Township of Amaranth, ON
- Country Meadows Estates Subdivision Environmental Impact Assessment (Part Lot 30, Concession 1) Township of Amaranth, Dufferin County, ON
- Melancthon II Wind Project Environmental Screening Report / Environmental Impact Statement, Township of Amaranth, ON

Environmental Impact Assessments for Various Land Development Proposals and Projects*, Ontario (Ecologist / Environmental Planner)

Projects involved assessment of development impact on the natural environment and recommending monitoring strategies in conformity with legislative requirements, including municipal Official Plans, the Provincial Policy Statement, the Aggregate Resources Act, the Oak Ridges Moraine Conservation Plan and conducting Municipal Class Environmental Assessments under the Ontario Environmental Assessment Act. Projects include:
- Rehabilitation of The Gore Road from King Street to Patterson Sideroad Municipal Class EA (Schedule B), Region of Peel, ON
- Kincardine Avenue Municipal Service Extension Municipal Class EA (Schedule B), Township of Kincardine, ON
- Municipal Class EA (Schedule C) for the East Luther Grand Valley Water Pollution Control Plant, Grand Valley, ON
- ORMCP Conformity Report for the Colgan Water Supply Municipal Class EA (Schedule B), Township of Adjala-Tosorontio, ON
- Bonaire Highlands Scoped EIS, Fergus, ON
- Veterans Way Lands EIS, Orangeville, ON
- Aberfoyle Creek Estates Phase III EIS, Aberfoyle, ON
- Giant's Tomb Subdivision EIS Review, Tiny Township, ON
- Pickering-Kingston Road Environmental Report, Pickering, ON
- Gamble Road Lot 5 EIS, Richmond Hill, ON
- Hilltop Community EIS, Ayr, ON
- Churchville Planning & Heritage Study, Natural Heritage Component, Brampton, ON
- Humber College Institute of Technology and Advanced Learning, Orangeville Campus, Environmental Management Plan Part B: Terrestrial and Aquatic Resources, Orangeville, ON

** denotes projects completed with other firms*

Vince Deschamps BES (Hons.), M.Sc.

Senior Environmental Planner

Goreway Direct Access Natural Gas Pipeline Environmental and Social Impact Assessment, Sithe Canadian Pipelines, Ontario (Project Manager)
Managed and prepared a Draft ESIA to construct and operate a 610 mm (NPS 24) natural gas pipeline to provide fuel for the 800 MW Goreway Station combined cycle gas fuelled power station proposed to be located on Goreway Drive in the City of Brampton, Ontario. The Draft ESIA was based on the Ontario Energy Board's "Environmental Guidelines for Location, Construction and Operation of Hydrocarbon Pipelines and Facilities in Ontario", and documented the information analysis and decision-making that resulted in the recommendation of a Preferred Pipeline Route, and the impact assessment, mitigation and monitoring measures associated with construction and operation of the pipeline.

Compatibility Assessment, Iron Ore Company of Canada*, Labrador (Project Manager)
Conducted an environmental, socioeconomic, and land use compatibility assessment for a proposed hospital and community college in the Town of Labrador City on IOCC's long-range mine plan. The assignment consisted of a quick assessment of the Town's proposed facilities, a technical assessment of the potential impacts of IOCC's mine plan on them, and input to the provincial and municipal EA processes required to develop these facilities.

Technical EA Reviews of the Detour Gold Project, Coral Rapids Power Limited Partnership & Taykwa Tagamou Nation*, Ontario (Project Manager / Lead Reviewer)
Served as project manager overseeing multi-disciplinary technical reviews, on behalf of Coral Rapids Power Limited Partnership and the Taykwa Tagamou Nation (TTN), of Environmental Assessment reports prepared for the Detour Lake gold mine project in northern Ontario. The reviews focused on the interests of the TTN, in particular how the proposed mine facilities, electrical transmission corridor and roads may affect them and how potential effects might be accommodated.

Cement / Aggregates

Dunnville Quarry Expansion Level 1 and 2 Natural Environment Technical Report, Waterford Sand and Gravel Ltd.*, Haldimand County, Ontario (Environmental Planner)
Prepared a Level 1 & 2 Natural Environmenta Technical Report for a proposed expansion of an aggregate quarry near Dunnville, Ontario. The report was required to meet the natural environment reporting requirements of the Aggregate Resources Act for a Category 2 – Class A Quarry (Below Water Table) and the EIS requirements of the Haldimand County Official Plan and Town of Dunnville Zoning By-Law. Natural heritage evaluations included Ecological Land Classification, vegetation inventories, breeding bird and amphibian surveys and input to the Rehabilitation Plan. The Level 1 & 2 Report was prepared in accordance with the 2010 Natural Heritage Reference Manual (MNR).

Upper's Lane Quarry, Walker Industries, Niagara Falls, Ontario (Project Manager / Environmental Planner)
Preparation of a Natural Environment Level 1 & 2 Report for the development of the Upper's Lane Quarry near Niagara Falls, Ontario. The report was required to meet the natural environment reporting requirements of the Aggregate Resources Act for a Category 2 – Class A Quarry (Below Water Table). A comprehensive suite of field investigations was undertaken, including Ecological Land Classification, winter wildlife surveys, breeding bird and amphibian surveys, snake surveys, insect surveys and habitat assessments for potential rare species and wildlife species at risk.

Township of East Garafraxa Gravel Pit Expansion*, Ontario (Project Manager / Ecologist)
Prepared a Natural Environment Level 1 & 2 Report for the expansion of the Township of East Garafraxa's existing licensed gravel pit operation near Orangeville, Ontario. The report was required to meet the natural environment reporting requirements of the Aggregate Resources Act for a Category 3 – Class A Pit (Above Water Table), and included Ecological Land Classification and a breeding bird survey.

** denotes projects completed with other firms*

Vince Deschamps BES (Hons.), M.Sc.

Senior Environmental Planner

Clinton Pit Level 1 & 2 Natural Environment Technical Report, Jennison Construction Limited*, Huron County, Ontario (Project Manager / Environmental Planner)

Prepared a Natural Environment Level 1 & 2 Report for a proposed gravel pit operation near Clinton, Ontario. The report was required to meet the natural environment reporting requirements of the Aggregate Resources Act for a Category 3 – Class A Pit (Above Water Table) and the EIS requirements of the Huron County and Ashfield-Colborne-Wawanosh Township Official Plans. Natural heritage evaluations included Ecological Land Classification, vegetation inventories, breeding bird surveys and the preparation of a Woodlot Restoration and Rehabilitation Plan. The Level 1 & 2 Report was prepared in accordance with the 2010 Natural Heritage Reference Manual (MNR), and was successfully defended at an Ontario Muncipal Board (OMB) hearing.

Conservation & Reclamation Planning

Javan Tiger Survey in Meru Betiri National Park, World Wide Fund for Nature (WWF)/Indonesia Programme, PHPA (Indonesian Department of Forest Protection and Nature Conservation) (1993)* (Project Manager)

Coordinated a field survey to determine the existence/status of the Javan tiger (Panthera tigris sondaicus) in Meru Betiri National Park and the surrounding area in East Java, using a combination of remote automated cameras and extensive field patrols to gather evidence of tiger and other large mammals.

Information Officer and Buffer Zone Initiatives in Ujung Kulon National Park, World Wide Fund for Nature (WWF)/Indonesia Programme, PHPA (Indonesian Department of Forest Protection and Nature Conservation) (1991-1993)* (Project Manager)

Developed and implemented a Park interpretation/awareness strategy for Park visitors and community extension programs in this World Heritage Site. Assisted with biological studies on the Javan rhinoceros (Rhinoceros sondaicus), and other large mammals. Developed alternative income sources for people living around the Park boundaries, including a traditional craft and tourist facilities cooperative. Related "buffer zone" activities included the formation of Village Environmental Advisory Boards and land/forest rehabilitation programs.

Development of a Model Reserve Management Strategy in the Danau Sentarum Wildlife Reserve, Asian Wetland Bureau/Indonesia Programme, Overseas Development Administration, PHPA (Indonesian Department of Forest Protection and Nature Conservation) (1993-1994)* (Project Manager)

Established a model reserve management strategy at the Danau Sentarum Wildlife Reserve, a remote floodplain reserve and RAMSAR site in West Kalimantan (Indonesian Borneo), via a process of combining ecological research with sustainable resource utilization by local people.

Evaluation of Community Forests as a Buffer Zone Initiative, Indonesia, Leuser Management Unit and CIDA Awards for Canadians (2000)* (Masters Thesis)

Developed and field-tested a model to evaluate the relationship between biodiversity and social benefits through community-based forest management in the Leuser Ecosystem. A secondary study was conducted among residents of the city of Medan to measure levels of awareness and concern of regional environmental issues, and their perceptions of the Leuser Management Unit.

Economic Analysis & Feasibility Studies

Value of Water Resources in Lore Lindu National Park, Indonesia, The Nature Conservancy (2001) (Project Manager)

This study investigated the economic contributions of waters arising from Lore Lindu National Park in Central Sulawesi. As part of this study, the framework for water and other resource valuations was developed using a combination of literature review, key informant interviews, field visits and data analysis. One of the key components was the development and application of the Agricultural Producer and Water User Survey that gathered primary data at the household level from a statistically-representative sample of rural households in the Study Area. In concert with other research techniques, the survey was used to estimate the value of agricultural production, livestock inventories and other sources of protein, and household and industrial water consumption. The study also estimated the total number of people who are dependent on water from LLNP for drinking, washing, bathing, and other day-to-day activities, as well as the total area of land irrigated by waters arising from the Park.

** denotes projects completed with other firms*

Vince Deschamps BES (Hons.), M.Sc.

Senior Environmental Planner

Value of Water Resources in Berau Regency, East Kalimantan, Indonesia, The Nature Conservancy (2002) (Project Manager)

This study estimated the economic contributions of water from the Kelay and Segah rivers in Berau Regency. The results present a conservative, but reliable estimate of the value of these contributions to the local economy using the framework developed in the LLNP Water Value Study. The study estimated the value of agricultural production, livestock inventories and other sources of protein, and household consumption of waters from these two rivers, the total number of people who are dependent on them for drinking, washing, bathing, and the total area of land irrigated by the two rivers. This study may also serve as a model to guide future conservation initiatives in Berau, and on the larger Mahakam River in East Kalimantan.

Carbon/Mangrove Rehabilitation Feasibility Study, East Kalimantan, The Nature Conservancy (2004)* (Project Manager / Lead Researcher)

Vince carried out a feasibility study for restoring mangrove forest using carbon-funding mechanisms. The feasibility study covered the technical and financing sustainability aspects, including a thorough literature review of previous efforts. Technical feasibility focused on South East Asia with emphasis on Indonesia and the financial aspects worldwide. The outcome documented how the Clean Development Mechanism (CDM) might be used to set aside forest concessions in ecologically sensitive areas in Indonesia.

Comprehensive Review & Overhaul of Barbados Groundwater Protection Zoning Policy & System, Barbados Water Authority (2008)* (Planning Specialist)

Vince served as a Planning Specialist to assess the social, financial and economic impact of land use restrictions in Groundwater Protection Zones 1 through 5. Assessment involved engaging a representative cross section of stakeholders and consisted of reviewing current and historic Government of Barbados' population and economic statistics, conducting two Public Information Centres and Key Informant Interviews to identify common land use practices affecting groundwater resources, conducting community mapping to assess the impacts of land use practices on groundwater resources and conducting water-user and land use surveys to determine social, financial and economic conditions in the five Zones.

Economic Impacts of Agriculture Studies*, Ontario (Researcher)

Vince played a significant role in the development and execution of a series of studies to assess the economic impacts of agriculture in various counties across Ontario. The focus of the research was to determine the economic value of sales and jobs related to agriculture, either directly or indirectly. The studies involved a combination of 'economic base' and 'input-output like' methods and incorporated secondary data from Statistics Canada, the Ontario Ministry of Agriculture, Food & Rural Affairs (OMAFRA), supplemented by primary data generated through the development, delivery and analysis of surveys of agriculture-related businesses, and focus groups with primary producers and mapping components. The studies were conducted in cooperation with the local (i.e., County-level) Federations of Agriculture, with the support of OMAFRA and Human Resources Development Canada. Vince organized and undertook studies in the following municipalities:

- United Counties of Prescott & Russell
- United Counties of Stormont, Dundas & Glengarry
- Lambton County
- Perth County
- Frontenac County
- Lennox & Addington County
- Elgin County
- Oxford County
- Middlesex County
- Lanark County
- Renfrew County
- City of Ottawa

Northwest Brampton Urban Boundary Review, Shale Resources Review, City of Brampton, Ontario (Researcher)

Conducted an economic assessment of the Greater Toronto Area market area for shale production an brick manufacturing, as well as determining the long-term demand trends and quantities for heavy clay products, most notably clay bricks.

Technical Writing

Various Writing and Editing Assignments in Indonesia (2005-2006)* (Project Manager)

In Indonesia, Vince has assisted CARE International and The Nature Conservancy with a variety of field assignments, project reports and professional papers. These include:

** denotes projects completed with other firms*

Vince Deschamps BES (Hons.), M.Sc.

Senior Environmental Planner

- Editing and technical input to CARE Indonesia's "Protection of Tropical Forests Through Environmental Conservation of Marginal Lands (PTF-EMCL) Phase II Final Report". Prepared for the Norwegian Development Agency (NORAD), January 2006
- Preparation of CARE Indonesia's proposal: "CDM-Based Reforestation in Rawa Aopa Watumohai National Park, Indonesia". Prepared for Canada's Clean Development Mechanism and Joint Implementation Office, November 2005
- Co-authored the TNC paper: "Trends in Forest Ownership, Forest Resources Tenure and Institutional Arrangement: Are they Contributing to Better Forest Management and Poverty Education? Case Studies from Indonesia". Prepared for the FAO Regional Workshop in Bangkok, Thailand, October 2005
- Editing and input to TNC's Interim Report: "A Comparitive Study on the Impacts of Inappropriate Land-Use and the Development of Participatory Watershed Plans". Prepared for the Japan Bank for International Cooperation, April 2005

** denotes projects completed with other firms*

Vince Deschamps BES (Hons.), M.Sc.

Senior Environmental Planner

PUBLICATIONS

Deschamps, V. and P. Hartman. 'Trends in Forest Ownership, Forest Resources Tenure and Institutional Arrangement: Are They Contributing to Better Forest Management and Poverty Reduction? Case Studies from Indoneisa'. *Understanding Forest Tenure in South and Southeast Asia. FAO Forestry Policy and Insitutions Working Paper No. 14. Rome*, 2006.

Deschamps, V. 'CDM-Based Reforestation in Rawa Aopa Watumohai National Park, Indonesia'. *Report prepared for Canada's Clean Development Mechanism and Joint Implementation Office*, 2005.

Deschamps, V. Presentation. 'Biodiversity and Social Benefits in Community-Based Forest Management: The Leuser Ecosystem, Indonesia'. *Ecological Integrity and Protected Areas, 2001: Proceedings of the Parks Research Forum of Ontario (PRFO) Annual General Meeting, pp. 201-208*, 2001.

Melissa Cameron M.Sc., OALA

Ecologist / Landscape Architect

As an Ecologist and Landscape Architect, with graduate degrees in Zoology and Landscape Architecture, Melissa possesses the necessary knowledge and skills to evaluate, manage and restore landscapes in a sensitive and sustainable manner. Melissa has a particular interest in wildlife conservation and habitat protection, and sees Landscape Architecture as an opportunity to link ecology with planning and design to positively influence natural and cultural landscapes. Her graduate research in Landscape Architecture involved assessing the potential for rehabilitated aggregate extraction sites to be used as reintroduction sites for Species at Risk, using metapopulation modeling and spatial analysis (GIS). She has written three, and edited many, species status reports for the Committee on the Status of Endangered Wildlife in Canada (COSEWIC).

EDUCATION

Master of Landscape Architecture, University of Guelph, Guelph, Ontario, 2007
Master of Zoology, University of Guelph, Guelph, Ontario, 2004
Bachelor of Science, Ecology, University of Guelph, Guelph, Ontario, 2001

MEMBERSHIPS

Member, Ontario Association of Landscape Architects
Member, Canadian Herpetological Society (formerly CARCNET)

PROJECT EXPERIENCE

Various Projects – field surveys for reptiles, amphibians, birds and insects (Ecologist)

Duntroon Quarry Proposed Expansion Ecological Reforestation and Monitoring Plan, Duntroon, Ontario (Landscape Architect)

Wildlife Habitat Council - Wildlife at Work Certifications, Various States (Project Manager and Habitat Designer)

Louisiana Wetlands Mitigation Bank, Louisiana (Project Manager and Conservation Lead)

Surplus Property Restoration and Disposition, Blacksburg, South Carolina (Project Manager)

Tools for Evaluating Conservation End-use Potential of Former Industrial Properties (Project Manager)

Acton Quarry Rehabilitation and Enhancement Plan, Acton, Ontario (Landscape Designer)

PUBLICATIONS

Cameron, M. COSEWIC status report on the snapping turtle, Chelydra serpentina, in COSEWIC assessment and status report on the snapping turtle, *Chelydra serpentina*, in Canada. *Committee on the Status of Endangered Wildlife in Canada, Ottawa, Ontario*, 2007.

Cameron, M., R. Brooks and J. Congdon. Adaptive significance of diapause in the turtle family Kinosternidae. *Oral presentation to the Ontario Ecology and Ethology Colloquium, University of Toronto, Ontario, Canada*, 2004.

Cameron, M. and R. St. Clair. COSEWIC status report on the Pacific pond turtle, Clemmys marmorata, in COSEWIC assessment and status report on the Pacific pond turtle, *Clemmys marmorata*, in Canada. *Committee on the Status of Endangered Wildlife in Canada. Ottawa, Ontario*, 2002.

Cameron, M., R. Brooks, N. Goodenough, K. McNichols and P. Wesley. Demography, Home Range and Habitat Utilization of Wood Turtles *(Clemmys insculpta)* in the Algoma District. *Unpublished project report to the Ontario Ministry of Natural Resources (MNR)*, 2002.

Cameron, M.A. and R.J. Brooks. Maitland river valley wood turtle population analysis. *Unpublished report to the Ontario Ministry of Natural Resources (MNR)*, 2002.

Natalie A. Leava M.Sc.

Terrestrial Ecologist

Natalie Leava is a terrestrial ecologist, whose practical skills include the identification of grasses, flowering plants, trees, lichens, and bryophytes, as well conducting wildlife surveys for bats, badgers, reptiles and amphibians according to recognized scientific protocols. She is certified in Ecological Land Classification (ELC) and the Ontario Wetland Evaluation System (OWES). Natalie has experience coordinating, executing and reporting on ecological field surveys, habitat identification and classification as well as determining ecological significance and conducting conservation assessments. As a result of her expanding role in conducting botanical and wildlife inventories, Natalie has developed a strong understanding of the requirements to assess Species at Risk and their habitats.

Her experience spans a range of projects across a variety of sectors, including oil and gas, aggregates, renewable energy (wind and solar) and urban development. In addition to her expertise in terrestrial ecology, Natalie is currently leading in the technical development of Natural Capital Assessments within Environmental Services, while creating an internal and external network for this new and innovative discipline.

EDUCATION

M.Sc., Applied, University College Cork / Ecological Assessment, Cork, Republic of Ireland, 2010

B.Sc., Honours, McMaster University / Earth and Environmental Sciences, Hamilton, Ontario, 2009

Certificate, Ontario Ministry of Natural Resources / Ontario Wetland Evaluation System (OWES), North Bay, Ontario, 2012

Certificate, Ontario Ministry of Natural Resources / Ecological Land Classification (ELC), Lindsay, Ontario, 2011

WHMIS Training Course, Guelph, Ontario, 2011

Boating License & Pleasure Craft Operator, Rosseau, Ontario, 2008

PROJECT EXPERIENCE

Cement / Aggregates

Various Proposed Aggregate Extraction Projects, Ontario (Terrestrial Field Ecologist)

Completion of ecological field surveys, including ELC and botanical inventories, amphibian, reptile, insects, bats, badger, and winter wildlife surveys. Projects included:
- Proposed Melancthon Quarry, The Highland Companies, Melancthon, Ontario
- Proposed Acton Quarry Extension, Dufferin Aggregates, Acton, Ontario

Upper's Lane Quarry, Walker Industries, Niagara Falls, Ontario (Terrestrial Field Ecology Lead)

Served as field ecologist and fieldwork coordinator. Completed field surveys, including ELC and botanical inventories, salamander, reptile, bumblebee, and winter wildlife surveys

Proposed Spencer Pit, Wellington County, Ontario (Terrestrial Field Ecology Lead)

Served as field ecologist and fieldwork coordinator. Completed field surveys, including ELC and botanical inventories, breeding amphibian, reptile, and breeding bird surveys

Environmental Impact Assessments

Hunter Property, North Dorchester, Ontario (Terrestrial Field Ecologist)

Conducted field surveys, including breeding amphibians, and ELC and botanical inventories

University of Guelph Victoria Lands Environmental Impact Study, Guelph, Ontario (Terrestrial Field Lead)

Served as field ecologist and lead for field program and survey coordination. Surveys included ELC and botanical inventories, breeding amphibian surveys, wetland delineation, and agency consultation

Activa Waterloo East Lands, Kitchener, Ontario (Terrestrial Ecologist)

Responsible for annual photomonitoring, preparation of photolog and reporting. Prepared ecological update on overall health of study area based on monitoring during construction

Natalie A. Leava M.Sc.

Terrestrial Ecologist

Renewable Energy

Grand Valley Phase 3 Wind Project, East Luther, Dufferin County, Ontario (Terrestrial Ecologist)
Served as terrestrial field lead, responsible for preparation and coordination of field program for 2012 and 2013. Performed ELC, OWES, vegetation surveys and mapping, as well as bat, amphibian, and reptile surveys. Prepared species at risk report and assisted in completion of NHA report

Bow Lake Wind Project, Algoma District, Ontario (Terrestrial Ecologist)
Served as field ecologist and assisted with coordination of surveys for species at risk and significant wildlife. Performed wildlife surveys for reptiles, amphibians, moose, waterfowl, and breeding marsh and woodland birds. Assisted with completion of the EEMP report

Niagara Region Wind Centre Project, Niagara Peninsula, Ontario (Terrestrial Ecologist)
Served as field ecologist and provided field work coordination assistance. Fieldwork included ELC, vegetation and botanical surveys, winter raptor surveys, breeding amphibian surveys, reptile surveys, and general habitat assessments. Prepared species at risk report

Grand Renewable Energy Park Wind Project, Haldimand County, Ontario (Terrestrial Ecologist)
Served as field ecologist for species at risk screening and implementing mitigation practices, and monitoring during construction

IPC Wind Project, Kent County, Ontario (Terrestrial Ecologist)
Served as terrestrial field lead for four proposed wind farms. Was responsible for fieldwork coordination and execution, and completion of preliminary constraint analysis reports

Post-construction Monitoring for Various Wind Farms, Ontario (Terrestrial Ecologist)
Led various post-construction surveys, including searcher efficiency trials, scavenger trials, and raptor searches. Performed species identification of bat carcasses. Was responsible for coordinating field surveys and training staff in field survey protocols. Projects included:
- KEPA Wind Energy Project, Kruger Wind Energy Chatham LP, Port Alma, Ontario
- Grand Valley Phases 1 & 2, East Luther, Dufferin County, Ontario

Various Wind Farms, Ontario (Terrestrial Ecologist)
Served as field ecologist and provided field work coordination assistance, including ELC, vegetation and botanical fieldwork. Participated in NHA reporting and field summary reports. Projects included:
- Cedar Point Wind Project, Municipality of Lambton Shores (Forrest), Ontario
- Sydenham Wind Energy Centre, Lambton County and Municipality of Chatham-Kent, Ontario
- Dorland Wind Energy Project, Gilead Power Corp., Dorland, Ontario
- Adelaide Wind Power Project, London, Ontario

Roadways

Environmental Consulting Firm in Ontario, Canada* (Junior Botanist)
Assisted and trained under senior biologist. Completed data entry for vegetative species list and ELC mapping. Participated in species at risk surveys and compensation programs. Projects included:
- Highway 407 Expansion, York and Durham Regions, Ontario
- Highway 60 Expansion, Algonquin, Ontario
- Detroit River International Crossing (DRIC), Ontario

Various Species at Risk Habitat Surveys for Transportation Projects, Ministry of Transportation, Sudbury, Simcoe, Cambridge and Chatham, Ontario (Terrestrial Ecologist)
Performed habitat surveys for Queen Snake, Bobolink, Blanding's Turtle

Natural Sciences & Heritage Resources

University College Cork, Environmental & Civil Engineering Department Hydromet Lab*, Cork, Republic of Ireland (Part-time Research Assistant)
Research included forest inventory, destructive tree sampling, biomass pools, fine root analysis, chemical analysis, and soil analysis, to compare net ecosystem balances of an improved grassland with a newly afforested grassland. Proposed research projects to supplement and complement existing eddy covariance data. Executed all associated field and lab work

** denotes projects completed with other firms*

Natalie A. Leava M.Sc.

Terrestrial Ecologist

Lake Simcoe Region Conservation Authority*, Newmarket, Ontario (Full-time Stewardship Assistant)

Interacted with homeowners in Simcoe Region to promote source water protection and provide public information regarding government funding programs available. Prepared and distributed information packages to homeowners

** denotes projects completed with other firms*

Natalie A. Leava M.Sc.

Terrestrial Ecologist

PUBLICATIONS

Peichl, M., N. Leava, and G. Kiely. Above and below ground ecosystem biomass, carbon and nitrogen allocation in a recently afforested grassland and adjacent intensively managed grassland. *Plant and Soil*, 2010.

Leava, N.A. A Baseline Ecological Assessment for Castlefreke, Co. Cork. *M.Sc. Thesis, University College Cork, Cork, Republic of Ireland*, 2010.

Leava, N.A. Bioremediation of Heavy Metal Leachate in Contaminated Oligotrophic Aquifers. *B.Sc. Term Paper. McMaster University, Hamilton, Ontario, Canada*, 2009.

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Leava, N. PAH Contamination of Soils and Remedial Process Available within North America. *B.Sc. Thesis Paper and Presentation. McMaster University, Hamilton, Ontario, Canada*, 2008.

James Leslie B.E.S.

Terrestrial Ecologist

James Leslie has over seven years of experience as a Terrestrial Ecologist with Stantec and is the Technical Lead for vegetation field studies. While James has acquired a diverse skill set, he has become a specialist in vegetation ecology with expertise in plant identification, Ecological Land Classification (ELC), wetland delineation, and vegetation monitoring. Additionally, he has gained extensive experience conducting and leading herpetofauna field surveys.

James completed his Bachelor of Environmental Studies at the University of Waterloo with a focus on applied ecology and environmental policy. He has obtained certification for Ecological Land Classification (ELC), Ontario Wetland Evaluation System (OWES), Ecological Monitoring and Assessment Network (EMAN), and is a Ministry of Natural Resources (MNR) designated Butternut Health Assessor. He is RAQS-certified by the Ontario Ministry of Transportation (MTO), a requirement for Lead Ecologists on MTO projects.

James provides professional input to agencies, lawyers, and clients for projects in a variety of sectors, such as aggregate, highway infrastructure, energy, and urban land development. He has authored or contributed to various reports, including Natural Heritage Assessments, Environmental Impact Statements, Environmental Assessments, and Natural Environment Technical Reports.

EDUCATION

Certificate, Royal Botanical Gardens / Aster & Goldenrod Identification Workshop, Burlington, Ontario, 2013

B.E.S., University of Waterloo / Environmental Studies / Geography, Waterloo, Ontario, 2006

Certificate, Humboldt Field Research Institute / Applied Field Identification of Grasses and Sedges, Steuben, Maine, 2010

Certificate, Butternut Health Assessment, Burlington, Ontario, 2009

Certificate, Ontario Wetland Evaluation System, North Bay, Ontario, 2009

Certificate, Ecological Monitoring and Assessment Network, Turkey Point, Ontario, 2008

Certificate, Ecological Land Classification for Southern Ontario, Kingston, Ontario, 2007

MEMBERSHIPS

Member, Ontario Invasive Plant Council

Member, Field Botanists of Ontario

PROJECT EXPERIENCE

Mining

Confederation Minerals, Red Lake, Ontario (Terrestrial Ecologist)

Lead Terrestrial Ecologist at prospective gold mine in remote northwest Ontario. Study consisted of desktop review of study area and GIS mapping of all vegetation communities. Field work consisted of strategic ELC ground-truthing of specific community types and wildlife/wildlife habitat surveys in these areas; followed up with technical report.

Kami Iron Ore Project, Port of Sept Iles, Quebec (Terrestrial Ecologist)

Lead Botanist for proposed rail reconfiguration at mineral shipping port. Developed vegetation community mapping and compiled a plant species list of all species present in each community, including tidal wetland communities. Objective of survey was to confirm presence/absence of species at risk and document observations. Prepared and submitted Rare Plant Survey Report to be appended to Environmental Impact Study (EIS).

** denotes projects completed with other firms*

James Leslie B.E.S.

Terrestrial Ecologist

Cement / Aggregates

Acton Quarry Environmental Review, Acton, Ontario (Terrestrial Ecologist)

Assist with seven years of amphibian surveys to identify and monitor significant wildlife habitat, species composition, and presence or absence of pure Jefferson salamander specimens. Overall, surveys included call-counts, egg mass surveys, pit and aquatic trapping, and tail clippings of potential Jefferson species (in conjunction with the OMNR).

Proposed Flamborough Quarry, Hamilton, Ontario (Ecologist)

Aquatic surveys included stream flow discharge and uploading of data loggers. Terrestrial surveys included winter wildlife surveys and health assessments of over 100 butternut trees using 2009 OMNR guidelines.

Duntroon Quarry Expansion, Duntroon, Ontario (Terrestrial Ecologist)

Designed and conducted a multi-year research program to assess the habitat characteristics of American hart's-tongue fern – a federal and provincial Special Concern species. Research examined natural associations with soil, ambient air, tree canopy cover, associate species, and snow depth. The purpose of this research was to document existing conditions of a known fern population and use the data to aid in identifying suitable transplant locations. A preliminary transplant of over 500 ferns was conducted where post-transplant monitoring studies are ongoing. Unrelated surveys conducted onsite include butternut health assessments and forest plot assessments using protocols outlined in the Ecological Monitoring and Assessment Network (EMAN).

Proposed Spencer Pit, Guelph, Ontario (Terrestrial Ecologist)

Lead Botanist for a proposed pit near Guelph, Ontario. Conduct ELC survey, two season botanical inventory, and assessment of wildlife habitat. Contribute to the Natural Environment Level 1 & 2 Technical Report.

Environmental Mitigation and Monitoring

Various Urban Lands Projects, Waterloo and Oakville, Ontario (Terrestrial Ecologist)

Monitor vegetation communities using Ecological Monitoring and Assessment Network (EMAN) and local Conservation Authority guidelines. Field surveys consisted of identifying vascular plants growing within pre-determined plots and determining their respective cover; photographic records were compiled each year for temporal comparison. Data analysis included calculation of frequency, dominance, and importance value. Deliverables consist of annual monitoring reports.

Georgia Pacific PCB Remediation, Thorold, Ontario (Terrestrial Ecologist)

ELC; mapping and evaluation of species at risk (Butternut); develop multi-year vegetation monitoring plan and conduct surveys to determine density, frequency, dominance, and importance value of plant species; data synthesis, and technical memorandum.

Oil & Gas

Enbridge Line 37 Spill Site, Fort McMurray, Alberta (Terrestrial Ecologist)

Lead botanist at site of recently ruptured petroleum pipeline in northern Alberta. Conducted full botanical inventory and vegetation community mapping of contaminated area; also conducted similar surveys in adjacent areas proposed for temporary use. Each survey required urgent submission of accompanying technical reports.

TransCanada Energy East Project, Various Locations, Ontario (Terrestrial Ecologist)

Assisted with the lead of vegetation field studies for Ontario component of proposed oil pipeline extending from Alberta to New Brunswick. Study area consisted of 104 km section of linear 'new-build' and proposed compressor stations situated across Ontario from Manitoba to Quebec. Desktop assessment included GIS mapping of all vegetation communities and background review. Conducted field surveys throughout 2013 consisting of ELC data collection and revisions to ELC mapping, seasonal botanical inventories, documentation of species at risk and significant wildlife habitat. Identified amphibian breeding habitat through air-photo interpretation and verified through a helicopter survey. Conducted anuran call-counts and Blanding's turtle surveys. Assisted the Soils Team with field data collection in organic wetland communities. Additional surveys planned for 2014.

** denotes projects completed with other firms*

James Leslie B.E.S.

Terrestrial Ecologist

Union Gas Lobo Compressor Station Expansion, Strathroy, Ontario (Terrestrial Ecologist)
Assist with Project Management of a proposed compressor station expansion, including proposal and budget; conduct/delegate appropriate field surveys; compile background data through review of Official Plan, Significant Wildlife Habitat Technical Guide, Ontario Provincial Policy Statement, etc.; agency consultation. Deliverables consisted of an Environmental Impact Study report.

Power Transmission & Distribution

Bruce to Milton Transmission Project, Milton, Ontario (Terrestrial Ecologist)
180 km linear study area of proposed hydro transmission lines from Bruce Nuclear to Milton, Ontario. Assisted with ELC, butternut health assessments, flora inventories, and winter wildlife surveys.

Renewable Energy

Terrestrial Surveys for Wind and Solar Projects, Various Municipalities, Ontario (Terrestrial Ecologist)
Conducted numerous pre-construction surveys under the Renewable Energy Approvals (REA) process for proposed wind and solar projects. Field work included ELC data collection and mapping of large study areas, often consisting of all optioned properties. Completed wetland delineations and evaluations using the Ontario Wetland Evaluation System (OWES), plant and wildlife inventories, and identification of significant wildlife habitat. Study areas included proposed turbine locations, access roads, and transmission corridors. Data analysis and technical reports were integrated into the respective Natural Heritage Assessment Reports for projects including but not limited to:
- Grand Valley Wind Farms Phase 3, Dufferin County, Ontario. Lead Ecologist for vegetation surveys; 17 wind turbines
- White Pines Wind Project, Prince Edward County, Ontario. Lead Ecologist for vegetation surveys; 28 wind turbines
- Amherst Island Wind Energy Project, County of Lennox and Addington, Ontario. Lead Ecologist for vegetation surveys; 36 wind turbines
- Bow Lake Wind Farm, District of Algoma, Ontario. Lead Ecologist for vegetation surveys; 36 wind turbines
- Port Dover and Nanticoke Wind Project, Haldimand and Norfolk Counties, Ontario. Terrestrial Ecologist; 58 wind turbines
- Sydenham Wind Energy Centre, Lambton County, Ontario. Terrestrial Ecologist; 44 wind turbines
- St. Columban Wind Project, Huron County, Ontario. Terrestrial Ecologist; 15 wind turbines
- Almonte Solar Project, Lanark County, Ontario. Lead Ecologist for vegetation surveys; 10 megawatt facility

Island Falls Energy Project, Smooth Rock Falls, Ontario (Terrestrial Ecologist)
Field work component of a proposed hydroelectric dam in remote northern Ontario. Assist with ELC, botanical inventory, and soil surveys in remote areas.

Avian Surveys for Wind and Solar Projects, Various Municipalities, Ontario (Terrestrial Ecologist)
Avian monitoring was conducted at Kingsbridge, Melancthon, Ostrander, Parkhill, and Plateau wind energy locations. Field work consisted of installation, troubleshooting, and data retrieval of Anabat SD1 monitoring devices. Received training for data interpretation and isolation of bat calls based on digital graph patterns. Post-construction surveys of avian mortality under active wind turbines were completed for the Kingsbridge and Melancthon locations.

Terrestrial Assessments

Master Service Plan, Cayuga and Jarvis, Ontario (Terrestrial Ecologist)
Develop ELC mapping for the towns of Jarvis and Cayuga. The purpose was to update natural heritage data for the respective Master Service Plan revisions. Data analysis included ecological constraints mapping and authoring a technical report.

Transportation Planning

Highway 3 Rehabilitation, Detail Design, Renton to Jarvis, Ontario (Terrestrial Ecologist)
This work was conducted to identify natural features where road widening and culvert replacement was proposed. Performed ELC and compiled records of local flora and fauna. The study area included Endangered butternut trees and a variety of forested, wetland, and cultural communities. A Terrestrial Ecosystems Report was submitted to characterize existing conditions, and to address predicted impacts and required mitigation to on-site vegetation communities, terrestrial wildlife and their habitat. Fieldwork and reporting conducted in accordance with MTO regulations and guidelines.

** denotes projects completed with other firms*

James Leslie B.E.S.

Terrestrial Ecologist

Highway 69, Preliminary Design, Patrol Yard Selection, Parry Sound to Sudbury, Various Sites, Ontario (Terrestrial Ecologist)

This study was undertaken in order to assess a number of alternative locations for patrol yards within the study area, and to identify preferred alternatives at three locations. Performed ELC, compiled records of local flora and fauna, and identified significant wildlife habitat. Natural heritage features consisted of numerous wetland communities, large, contiguous forests, significant wildlife habitat and observations of a Threatened species. Fieldwork and reporting were conducted in accordance with MTO regulations and guidelines.

Highway 17, Preliminary Design, Sudbury Southwest Bypass, Sudbury, Ontario (Terrestrial Ecologist)

The purpose of this study was to identify a four-lane highway plan for a section of Highway 17 through the Sudbury area, with access restricted to interchange locations only. Performed ELC, compiled records of local flora and fauna, and identified significant wildlife habitat. The study area included a variety of upland and wetland habitats, including Areas of Natural and Scientific Interest. Fieldwork and reporting were conducted in accordance with MTO regulations and guidelines.

Highway 11, Preliminary Design Study, Access Review from Powassan to Callander, Ontario (Terrestrial Ecologist)

This project was part of a study to upgrade the highway to 'full freeway standard', which included eliminating at-grade intersections and entrances and providing access to highway only at interchanges. Performed ELC, compiled records of local flora and fauna, and identified significant wildlife habitat. The study area included a variety of upland and wetland habitats. Fieldwork and reporting were conducted in accordance with MTO regulations and guidelines.

Highway 401 and Highway 8 Improvements, Preliminary Design, Kitchener, Ontario (Terrestrial Ecologist)

This study was undertaken to assess proposed interchange improvements in the cities of Kitchener and Cambridge along Highway 401 and Highway 8. Performed ELC, compiled records of local flora and fauna, and identified significant wildlife habitat. The study area included rare flora, Provincially and Locally Significant Wetland, and an Area of Natural and Scientific Interest (ANSI). A Terrestrial Ecosystems Report was submitted to characterize existing conditions, and to address predicted impacts and required mitigation to on-site vegetation communities, terrestrial wildlife and their habitats. The preliminary impact assessment included constraint ratings of each ELC unit and the calculation of the areas potentially affected by the Preferred Plan. Fieldwork and reporting conducted in accordance with MTO regulations and guidelines.

Highway 11, Preliminary Design Study, Improvements North of Highway 144, Huntsville, Ontario (Terrestrial Ecologist)

The purpose of this study was to undertake the Planning, Preliminary Design and Environmental Assessment for improvements to Highway 11 from 1 km north of Highway 141, northerly for 5.5 km. Performed ELC, compiled records of local flora and fauna, and identified significant wildlife habitat. The study area included a rare vegetation community not previously documented and a variety of upland and wetland habitat. A Terrestrial Ecosystems Report was submitted to characterize existing conditions, and to address predicted impacts and required mitigation to on-site vegetation communities, terrestrial wildlife and their habitats. Fieldwork and reporting were conducted in accordance with MTO regulations and guidelines.

Highway 11, Preliminary Design Study, South Entrance to Powassan, Powassan, Ontario (Terrestrial Ecologist)

This study was carried out to update a Preliminary Design Report that recommended interchange locations for this stretch of Highway 11. Performed ELC, compiled records of local flora and fauna, and identified significant wildlife habitat. The study area included significant features, a variety of habitats, and cultural communities. Fieldwork and reporting were conducted in accordance with MTO regulations and guidelines.

** denotes projects completed with other firms*

James Leslie B.E.S.

Terrestrial Ecologist

Municipal Road Improvement Projects, Various Sites, Ontario (Terrestrial Ecologist)

Conducted ELC and wetland delineations using OMNR protocols. Identified wildlife habitat and determined potential impacts and mitigation options.
- City of London, Southdale Road Widening
- City of London, Hamilton Road Improvements

Victoria Road North Class EA, Guelph, Ontario (Terrestrial Ecologist)

Assist with Task Management for a proposed road widening, including background data review of applicable legislation and guidelines; conduct or delegate appropriate field surveys; agency consultation; prepare a draft Natural Environment Technical Report and constraints analysis for a proposed parking area.

** denotes projects completed with other firms*